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Agriculture.

DESTRUCTION OF NUT GRASS.

BY MAJOR A. J. BOYD.

How to get rid of this widely spread pest on cultivated lands has for many years past baffled practical agriculturists, whether farmers on a large scale well equipped with a variety of weed-destroying implements, or small farmers and market gardeners, who, although working small areas of land, are yet puzzled as to how to conquer the ubiquitous weed. Even scientific men who have experimented for many years in the endeavour to find a remedy have failed to do so. How to do so has been the theme of hundreds of articles in as many newspapers, but all in vain.

In May, 1903, it was brought under the notice of the Department of Agriculture of Queensland that in the Singleton district of New South Wales this noxious sedge, erroneously called grass, was dying, owing to the attacks of an insect parasite, and subsequently the same insect was referred to in the local Press, and was denominated by its entomologist as a "coccid" of the "free moving class." At the same time it was stated that nut-grass plants on which the insect occurred were being disseminated amongst cultivators of the soil in order to secure its establishment, and consequent co-operation in exterminating the weed named in localities remote from that in which the so-called "coccid" had been discovered.

Not long afterwards parcels of such plants were placed under offer, with certain conditions, in different agricultural districts of Queensland, and I believe these were despatched to those who were desirous of experimenting on the pest. The Queensland Government Entomologist, Mr. H. Tryon, with commendable foresight, had, however, anticipated the arrival of such consignments, and had taken steps, in accordance with "*The Diseases in Plants Act of* 1896," to intercept them, it being, in his opinion, essential to ascertain, before admission, not only the generic and specific identity of the insect, but also the degree of probability of its attacking other plants than the one for whose destruction it was being introduced.

On comparison with the account of a European insect—*Antonina purpurea*—he found that the new insect presented the structural features assigned to it.

Meanwhile, it was certified officially by the New South Wales Department of Agriculture that this insect, as far as was then known, had been found to be exclusively associated with nut grass.

This was a question of great importance, especially as all the known *Antonina* species were injurious to members of the grass family.

It has since been shown that the insect attacks grasses—both native and introduced (H. Tryon)—and that its check to nut grass is slight, confined to land undisturbed and chiefly exercised in dry seasons (W. W. Froggatt). At a previous Queensland Agricultural and Pastoral Conference, in 1890, the question of nut grass destruction was debated, and several well-known farmers, sugar-planters, and others suggested various modes of keeping down nut grass, some recommending its being kept down by close-feeding down with stock, or by allowing pigs to root over the infested land. Mr. W. Gibson, of Bingera (Bundaberg district), stated that he had thoroughly cleaned a patch of the weed by covering it with molasses. But he had also had excellent results by the constant use of the Planet Junior, and he considered that, with the help of this valuable implement, no harm whatever would be done by the nut grass to any crop.

An exhaustive paper on this subject will be found in a very early number of the "Queensland Agricultural Journal" (November, 1899), written by the late Mr. Philip MacMahon, Curator of the Brisbane Botanic Gardens in that year, which would be well worth reproducing.

His conclusion was that nut grass cannot be eradicated, but it can be so dealt with as to be rendered perfectly harmless. The velvet bean was tried, and it was found that the nut grass did not thrive under its dense shade. The experiment showed that a good mode of getting rid of the pest is to smother it with a dense mass of this bean, seeding down the infested land heavily. [The present condition of the Botanic Gardens lawns would appear to indicate that its eradication is practicable.—ED.]

Since those early days, many experiments have been made, but not in Queensland. The following comes from the land of agricultural experiments, the United States of America, and I have forwarded a letter I received last month from the Director of Weed Investigation, Bureau of Plant Industry, Washington, United States of America, to the Editor of this journal, suggesting at the same time that its publication will induce some of our Queensland farmers, who would like to see the last of their nut grass destroyed, to try the velvet bean. I may incidentally state this bean is a prolific leaf-producer, giving a very dense shade, and is also exceedingly hardy.

The following is the report referred to:—

"Nut grass is perhaps the most troublesome weed in the southern coastal States, from Maryland to Texas. The species is also regarded as a pest in Arkansas and California. The plant is frequently confused with chufa, from which it can be distinguished by the bitter-flavoured nuts arranged on slender underground stems like widely-separated beads on a string, as contrasted with the sweet-flavoured nuts of chufa, which occur singly. Nut grass is popularly supposed to reproduce by means of seed as well as by nuts, but extensive investigation has failed to reveal either seedlings or viable seeds.

"One of the most important phases in connection with the control of nut grass is the eradication of small patches scattered in the field. Experimental evidence has demonstrated that the most practical and economical method of eradicating small patches is the application of dry agricultural salt (the cheapest grade obtainable), at the rate of from ½ lb. to 1 lb. per square foot.

"It is practically impossible to eradicate nut grass entirely over extended areas of infestation. Nut grass land can be handled in such a manner, however, that the presence of the weed will not prove a serious detriment after the first year of effort. An excellent system of handling nut grass land follows:—

(1) Plant the infested land in corn (or cotton), preferably in check rows. Prepare the seed bed with more than ordinary care. Following each cultivation, the nut grass growing in the rows should be chopped out with a hoe in order that no green growth be allowed to persist. It is desirable to sow soy beans in the corn rows where practicable.

(2) Cultivate at least once a week, using the knife or sweep type implement. Care should be exercised not to scatter the strings of nuts to uninfested land, as is so frequently done by spiked-toothed and spring-toothed harrows, and by the shovel-type cultivator.

(3) As soon as the crop is removed, plough and harrow the land and seed with a winter cover crop, preferably oats and hairy (winter) vetch, a combination cover crop that is particularly successful in subduing nut grass.

(4) The following spring, after the oats and vetch have been harvested for hay, repeat the entire process.

"The nut grass on land handled under this system will be thinned out to such an extent that the weed will cease to be very troublesome. The few surviving nut grass plants should be cut out with a hoe. The rotation has the virtue of continuous use of the land, while the nut grass is being brought under control.

"There is no easy method of controlling nut grass, but there are many helpful points that have been developed from practical experience and experiments. The following suggestions will all be found helpful in dealing with nut grass land:—

"1. *Smother Crops.*—Nut grass will not grow in dense shade, hence any crop which will produce a thick luxuriant growth, such as velvet beans, cow peas, and soy beans sown broadcast is helpful in controlling the weed. The best results have been obtained experimentally with velvet beans. A plot of land heavily infested with nut grass was sown to velvet beans for three successive seasons, and hardly a sprig of the weed grew in the dense shade of the beans. Smother crops are useful on rich lands only, and are not successful against nut grass unless a thick, heavy stand can be grown. Other smother crops available are sweet sorghum and corn in close drills.

"2. *Grazing.*—Geese turned into cotton fields infested with nut grass will keep the tops of the grass closely clipped, and will thus hold the weed in subjection. It is advisable to give the birds other range occasionally in addition to the cotton fields. One farmer estimated that ten geese were equal to one hoe hand in his cotton. Small areas of heavily infested land may be ploughed and hogs allowed to graze the nuts, which they relish. Unless the nuts are abundant, the hogs will starve if given no other feed.

"3. *Freezing.*—The nuts are unable to withstand freezing, consequently it is good practice, particularly in the northern part of the nut grass range, to plough in the fall and leave the land rough over winter in order to expose as many of the nuts as possible to frost. A single freeze has been known totally to eradicate nut grass in ploughed land.

"The use of chemical plant poisons, applied in the form of sprays or otherwise, has been found to be impracticable in dealing with nut grass."

KAPOK.

As several inquiries have been received recently about the cultivation of Kapok, the following information has been compiled by the Government Botanist (Mr. C. T. White) for the guidance of those contemplating the cultivation of this product.

Source.—The principal tree yielding the Kapok of commerce is *Eriodendron anfractuosum* (synonyms—*Ceiba pentandra* and *Bombax pentandrum*), a tree very widely spread over the tropics of both the new and the old worlds. The principal supplies of Kapok come from Java, where the Eriodendron or Ceiba tree has for some years been under plantation cultivation. Ceylon, India, and Tropical Africa supply smaller quantities.

Other and inferior kapoks are yielded by many plants, some of which are natives of North Queensland, as for instance the Indian Simal or Silk-cotton Tree (*Bombax malabaricum*), species of *Cochlospernum*, &c. None of these, however, command prices equal to that of the true Kapok (*Eriodendron anfractuosum*).

Description.—A tall tree with a straight trunk, prickly when young, with whorls of horizontal branches. Leaves palmately divided into 7-9 leaflets. Leaflets 2½ to 6 inches long, edges entire. Flowers whitish or in some varieties rose-coloured. Seed pod oblong, about 6 inches long; seeds numerous in a pod, covered with a fine silky floss.

Cultivation.—The tree can be grown practically along the whole of the Queensland coastal belt from Brisbane northwards. It naturally does best in the tropics.

It is a high tree, attaining a height of over 100 feet and a barrel diameter of over 3 feet.

It can be propagated by cuttings or seed. Cuttings are generally preferred, as the young trees from them are usually spineless and also yield quicker returns.

A suitable distance to plant the trees would probably be about 20 to 25 feet apart. Though probably in Australia, if grown at all, the most profitable way to grow them would be as a side issue, as windbreaks or shade trees, rather than in the form of pure plantations.

From an illustration by Greshoff.]

PLATE 17.—KAPOK TREE, FLOWERING BRANCHLET, AND A RIPE SEED POD.

The following notes are taken from a translation in the Kew Bulletin of an article by Dr. E. Ulbrich in "Notizblatt des Botanischen Gartens, Berlin," 1913, pp. 1 to 34, on Kapok Cultivation in Tropical Africa:—

> Wild Kapok is of little importance for the world's supply on account of the relatively small and uncertain amount of the yield, and the soiling of the wool, which is due to the capsules having to be picked from the ground after they have ripened and fallen, on account of the great height and spiny nature of the trees.
>
> In the plantations the young Kapok trees are usually raised from cuttings. Branches as thick as a man's arm are cut off and planted 3 to 4½ feet deep in the ground, and stripped of their leaves. They grow quickly and usually give rise to spineless trees, which come into bearing rather earlier than seedlings. When the trees grow too high they are lopped in order to facilitate the collection of the fruits and to give more light to the trees planted in between.
>
> Seedlings are transplanted from the seedbeds after six to twelve months or, preferably, after eighteen to twenty-four months. The young plants grow rapidly if they are stripped of leaves and lopped at about 1½ to 2 feet above the ground. Growth is then very quick, and the trees commence to yield when they are four to six years old. Reproduction by seedlings is apt to be unsatisfactory, as the results are much less certain than by cuttings, and spiny forms are apt to occur. The best work on Kapok cultivation is G. F. J. Bley's "De Kapokcultuur op Java."

Diseases and Pests.—The trees do not seem to be bothered much by insect or fungus pests. On this subject Dr. Ulbrich goes on to say—

> The Kapok plantations do not appear to be affected to any considerable extent by parasitic fungi.
>
> They suffer, however, from the attacks of several insects, of which the most harmful are the red bugs, *Dysdercus* spp., which live in the fruits and destroy the wool. Among other insects which injure the fruits are species of *Earias* and *Helopeltis*. Quantities of the young fruits are destroyed by flying foxes. The beetle *Batocera hector* bores into the trunks and sometimes kills young trees. When a tree attacked by it is found, the holes should be filled with benzine and stopped with clay.
>
> Great damage is done to the Kapok plantations in Java by various kinds of mistletoe (*Loranthaceæ*), but nothing is yet known as to the extent to which the Kapok trees are affected by these parasites in Africa.

Uses.—Kapok is used for stuffing cushions, mattresses, &c. It is also used in the manufacture of lifebelts, for which purpose its great buoyancy renders it eminently suitable.

The seeds yield an oil and the residue can be used for manure or in the manufacture of oil cakes for stock foods.

Of other and minor uses an article in the Kew Bulletin for November, 1896, states:—

> "In India the tree yields an almost opaque gum of a dark-red colour, which is said to be astringent, and to be employed medicinally in bowel complaints. The wood is soft and used in tanning leather. An inferior reddish fibre is sometimes prepared from the bark, which is used locally for making ropes and paper. It possesses, however, no commercial value; and the barking of the tree would not compensate for the injury done to it as a source of floss. The young roots are also used medicinally in Bombay. They are dried in the shade, powdered, and mixed with the juice of the fresh bark and sugar. In Java the growing silk-cotton trees are commonly used as telegraph posts, as the branches grow so conveniently at right angles to the trunk that they do not interfere with the wires."

Preparation for Market.—The seed is cleaned by machinery and the floss pressed into bales.

The seeds freed of floss should have a similar value to those of cotton for the expression of oil and the manufacture of the residue into stock food and manurial cake.

THE NATIONAL EXHIBITION, 1921.

The Brisbane Exhibition is rightly regarded as a microcosm of the State, a representation in miniature of the rural industry of a realm, and the 1921 Show will go down in the records as one of the most successful from every point of view yet held. To those who have had an opportunity of judging, the principal show of Queensland compares rather favourably with the Royal Show, the Highland Show, and other annual stock and agricultural exhibitions in the United Kingdom. The outstanding features of this year's show were the district and one-farm exhibits, dairy and beef cattle, the forestry section, the fruit exhibits, and the display made by the Department of Agriculture and Stock. The Returned Soldiers and Sailors Producers' Association, of Woombye, were exhibitors for the first time, and their display was one of the attractions of the show. A dehydrator at work was a very popular feature, and in its neighbourhood the products of the Queensland State Cannery attracted wide attention.

DEPARTMENT OF AGRICULTURE AND STOCK.

The court of the Department of Agriculture and Stock represented an effective and practical illustration of the activities and work of its officers and staff.

The exhibit generally was indicative of the prominent part which agriculture in its true sense plays in the development of a country; and the outstanding feature in the display was the attention paid throughout every section to what may be termed its educational side.

The chief exhibits in the court were illustrative of the State's principal primary industries, and of the technical work of the officers of the Department.

Chief among the exhibits were:—

A comprehensive collection of varieties of sugar-cane from the Bureau of Sugar Experiment Stations.

A display of Merino and Corriedale wools.

An exhibit from the Stock Experiment Station, Yeerongpilly, with special reference to the tick problem, and to the work of the Institute in its relation to the stockowner and dairyman, and the part played in the preparation of vaccines and other specifics, to combat stock diseases; also of the preparation of cultures of various kinds for use in the manufacture of butter and cheese.

A collection of indigenous grasses and weeds; and of plants reputed as poisonous to stock.

A display of maize, to illustrate the improvement being effected by the seed selection work carried on by the Department.

An exhibit of wheats now in cultivation, both in the sheaf and grain form, and similarly of new varieties raised principally at the Wheat Breeding Farm at Roma; also samples of grain about to be sent to London for exhibition purposes. Milling and analytical tests of the Roma State Farm wheats were included in the exhibit, together with descriptive cards.

Samples of different varieties of barley, and oats, and a large assortment of farm and garden seeds.

An educational display of named varieties of sweet potatoes, with comparative details of data respecting the characteristics of each variety.

Two exhibits of cotton, one of which was arranged as a trophy to represent a waterfall, the second trophy being devoted to a display of representative samples from the principal cotton-growing centres in the State. Oil and cotton seed by-products were also included.

Collections of grain or dry district sorghums introduced from the Sudan (Lower Egypt), and from the Bureau of Plant Industry, U.S.A.

Special exhibits of Sudan grass plant specimens to illustrate the work of seed selection designed and being carried out by the Roma State Farm to improve the fodder and hay qualities of this valuable grass.

A collection of cowpeas in plant and seed form to show the improvement work being carried out with this plant also at the Roma State Farm.

A pure seeds display, specially arranged to educate farmers to the advantages to be gained by sowing seeds of high-producing capacity, of good germinable quality, and cleansed of all impurities.

A comprehensive display made by the Entomologist and Vegetable Pathologist, included in which was some interesting work dealing with the banana borer beetle.

An industrial exhibit from the Agricultural College, Gatton, showing the work performed by students, coupled with the display of dairy and farm products and of fodders and concentrates used in stock feeding, with special reference to the use of crushed cotton seed.

The court, as a whole, with its festoons of asparagus fern alternating with bird's nest, staghorn, and other ferns, was set off by an effective colour scheme in ivory and white, and shades of purple relieved with maroon and gold, giving to the *tout ensemble* a strikingly artistic effect.

An innovation this year in the court was an Inquiry Office. Here visitors were able to familiarise themselves with what the Department is doing, and to arrange to be kept in touch later with the work through the medium of the "Queensland Agricultural Journal."

SUGAR EXPERIMENT STATIONS' EXHIBIT.

The Bundaberg and Mackay Sugar Experiment Stations exhibited a number of new varieties, many of them being seedling canes raised in Queensland, Hawaii, Mauritius, India, and Java. There were also some canes from the adjacent island of New Guinea. Full descriptions of these appeared upon the cards attached to the canes, which also gave their commercial cane sugar content. Many of these canes are at present undergoing chemical and field tests, while others have passed the probationary period and are being distributed to canegrowers. Of these, the most successful so far have been Queensland 813, 970, 1098, Java E.K.1, E.K.28, India Shahjahanpur No. 1, Hawaii 146, and 227. These, however, only comprise a small part of the canes which have been distributed from the sugar experiment stations in the course of the past twenty years. Prior distributions included such well-known canes as Badila and the Gorus, which are very largely grown in North Queensland. One of the principal objects of the experiment station is the constant introduction of new varieties and their commercial testing. Before any cane varieties are allowed to leave the experiment stations they have to pass chemical and commercial trials through plant, first ratoon and second ratoon crops. Each variety is tested not less than four times during the sugar season, so that records are obtained giving farmers and millowners information as to whether canes are early or late, and as to whether their sugar contents are sufficiently high to warrant their adoption. This is combined with agricultural trials on the field, so that it may be determined whether such varieties are good croppers. They are further rigorously watched for evidence of disease, and no affected canes are allowed to go into distribution. When varieties have passed these trials they are carefully examined and packed before being sent to growers living at a distance from the stations. Farmers close at hand are permitted to visit the stations and remove the varieties selected for distribution. All canes are distributed free to canegrowers. The worthless varieties are discarded. Information of this kind could only otherwise be secured by growers and millers at the cost of much time and money, and the rejection of many useless canes by the mills, which would be accompanied by severe loss to the growers.

In addition to the work recorded, the experiment station at Innisfail has now commenced work in the direction of raising cane from seed.

Work at the experiment stations also comprises the study of soils, cultivation, and fertilising. It is sought to introduce improved methods of cultivation, liming, fertilising, rotation of crops, conservation of moisture, and growers are taught the principles of cultivation and business methods by visits to the experiment stations, and by lectures and addresses delivered in the various sugar districts, and by the issue of bulletins. It may be claimed that this work has been highly successful, as the following figures, showing the increase in cane and sugar produced per acre and decrease in tons of cane required to make one ton of sugar, will show:—

	1899-1908.	1909-1918.
Average tons cane per acre	14.76 ..	17.37
Average tons sugar per acre	1.60 ..	1.99
Average tons cane to one ton of sugar ..	9.20 ..	7.76

The sugar experiment stations analyse soils free for canegrowers, and give advice by personal interviews or by letter on the requirements of the soil in the way of

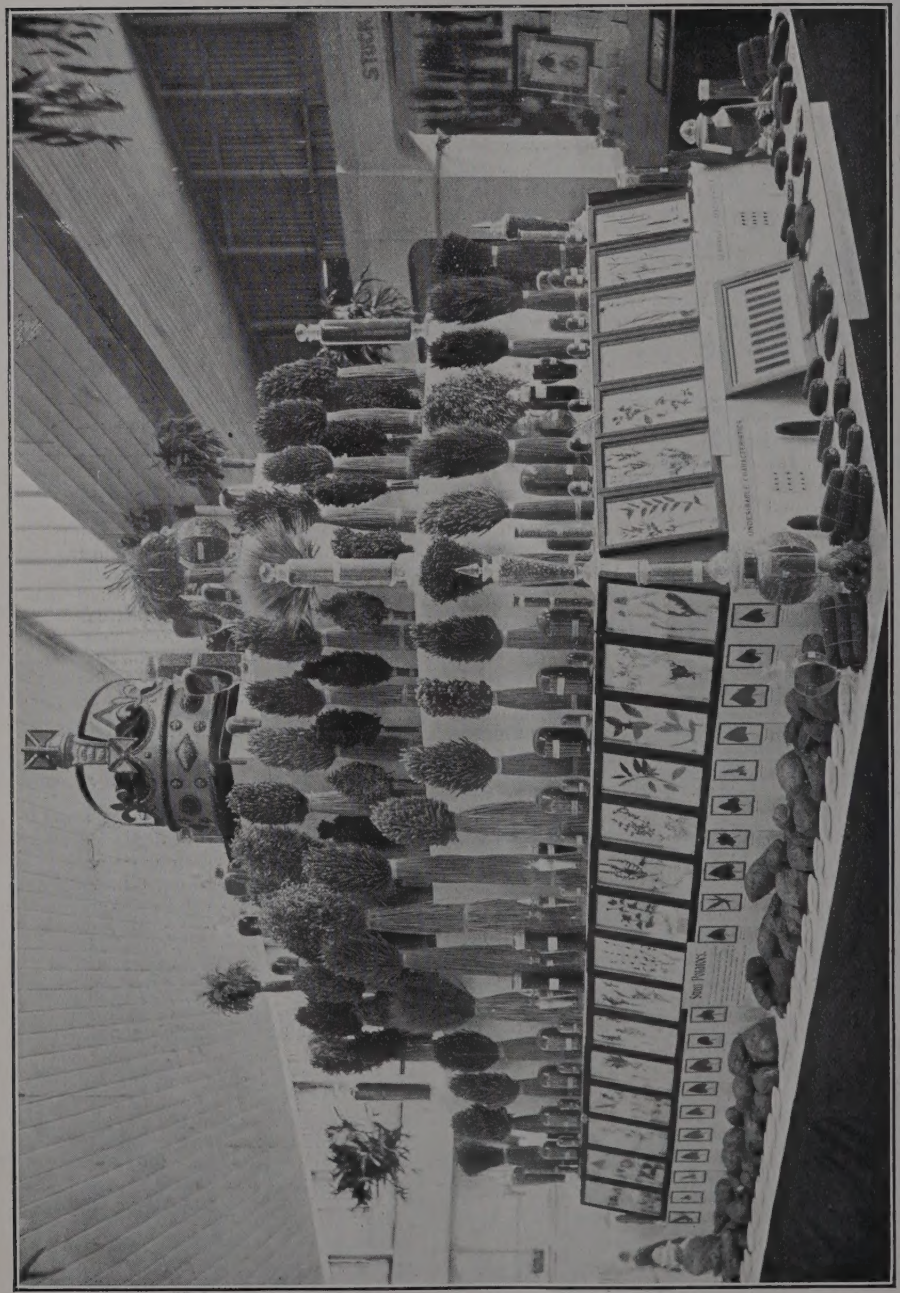


Photo. Department of Agriculture and Stock, Brisbane.]

PLATE 18.—CENTRAL TROPHY OF GENERAL AGRICULTURE, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921

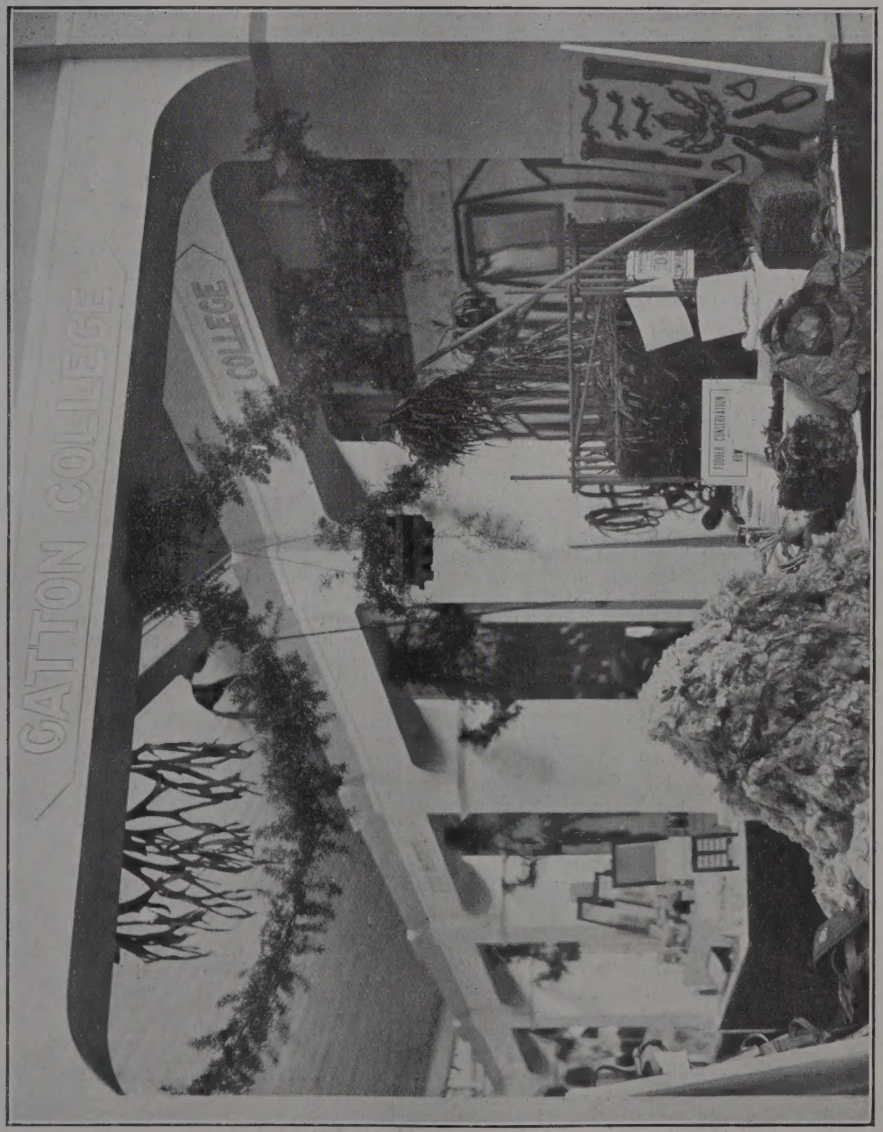


PLATE 19.—GATTON COLLEGE STUDENTS' WORK AND PRODUCTS—DEPARTMENTAL DISPLAY, NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

application of lime where necessary, green manuring and fertilisers, and the treatment of the land by proper soil handling. Cane samples are also tested free of charge, so that growers may know the best time in which to cut their cane. Field officers move around amongst farmers, giving advice on cultural operations.

Investigation and research work in connection with the sugar-cane's most serious pest, viz., the grub, is now being carried out by the Bureau of Sugar Experiment Stations in a systematic manner, and numerous bulletins have been issued upon the subject. The entomological laboratories are situated at Meringa, near Cairns, which is the centre of the worst grub-infested region in North Queensland. Work being undertaken includes:—

Morphological study of reproductive organs of beetles, with relation to the period of ovipositing and the number of eggs produced.

Morphological study of the fungus parasites.

Breeding of the various local parasitic and predaceous insects in cages.

Introduction and breeding of beetle parasites from other countries.

Experimental methods for the rapid multiplication and wide distribution of our fungus parasites.

Introduction of bacterial and fungus enemies of the beetles from other countries.

A further study of various light-traps for the beetles.

A further study of repellents.

Field and laboratory experiments in the use of poisons for the grubs.

Field experiments to determine the relation of fertilisers to resistance, using green manure, stable manure, meatworks refuse, nitrate of soda, and other fertilisers.

The work of the sugar experiment stations, therefore, in relation to its promotion of the agricultural welfare of Queensland in connection with the sugar industry cannot be over-estimated. When it is considered that this industry is the greatest agricultural one in Queensland, and will produce a yield of 250,000 tons of sugar this year, estimated to be of the value of over £7,500,000, it can be seen how highly necessary it is that it should be assisted and encouraged in every possible way. Apart from its economic value, however, it has a deep national significance, and has already played a very large part in peopling the North. According to the recent census, the increase in population in the last ten years in the Herbert Electoral Division was 19.4 per cent. or 14,929 persons, a greater increase numerically than in any other part of Queensland.

THE SUGAR BELT.

Apropos of the sugar industry, it is to be noted, on reference to a map of the State, that the land in Queensland used for sugar-growing is included in a long, narrow, coastal belt. Parts of this belt are separated from each other by considerable tracts of non-sugar country. The latter, owing to a deficient rainfall or poorness of soil, are not utilised for cane. This belt is included between latitudes 16 deg. and 28 deg. south, and the bulk of the staple is grown within the tropics. Cane soils vary considerably in character and composition.

District.	Soils.
Cairns.. ..	Partly shaly sterile soils, but in the main, deep alluvial sandy loams, also rich red volcanic soils.
Mackay ..	Shaly in parts, with better alluvial over the lower levels. Mixed volcanic and rich siliceous alluvia.
Bundaberg ..	Rich alluvial delta soils, interspersed with sterile soils and deep rich red volcanic soils.

The bulk of the sugar soils can be stated to be from good to rich alluvial, such as river flats, with deep red volcanic soils of considerable depth. The nature of the country is generally designated "scrub" and "forest." The North Queensland scrubs are really jungles, carrying a thick growth of what is known as scrub timber, such as silky oak, bean, pender, kauri, silkwood, Johnstone River hardwood, interlaced with lawyer vine and other creeping plants, while the stinging tree is also conspicuous. Forest country usually consists of ironbark, bloodwood, Moreton Bay ash, blue gum, poplar gum, and acacia.

The following are average analyses of a number of soils from each of the three sugar districts mentioned:—

District.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.
Cairns	·292	·310	·141	·122
Mackay	·329	·223	·165	·122
Bundaberg	·636	·144	·404	·120

Rainfall.—The Queensland rainfall, fortunately, is highest during the summer period, at which time the cane plant makes its maximum of growth. The following are average rainfalls in the principal sugar-growing districts:—

Cairns	92.65
Johnstone River	160.88
Herbert River	84.91
Mackay	66.67
Bundaberg	44.40

Cane grows best when the relative humidity of the atmosphere is high, and this is the case during the wet season in Northern Queensland.

Queensland's sugar production in 1867 was 338 tons, and in 1917, 307,000 tons.

Australia is the only place in the world where cane sugar is produced by white labour. We are in competition with countries which produce sugar by black labour and under black-labour conditions. In Java, wages are only about one shilling a day, the worker keeping himself. Without protection through the tariff, or regulation of the price by the Government, it would be quite impossible for the Australian industry to survive.

There is stated to be about £15,000,000 invested in the Queensland industry. It is the greatest industry in the State.

No other agricultural industry in Australia employs so much manual labour.

THE STOCK DISEASES EXPERIMENT STATION, YEERONGPILLY.

At the Exhibition the range of exhibits from this station comprised:—

Economic bacteriology and laboratory products, including vaccines for blackleg, contagious mammitis in cows, strangles in horses, and autogenous vaccines for sepsis.

Natural pleuro-pneumonia virus specially prepared, and blood taken with antiseptic precautions for inoculation for tick fever. Tuberculin for diagnosing tuberculosis. Pure cultures of lactic acid bacteria for the ripening of milk and cream in the manufacture of cheese and butter.

Pure cultivation of disease-producing organisms growing in tubes of artificial nutrient media. Tubercle bacilli (human and bovine), malignant œdema bacilli, blackleg bacilli, anthrax bacilli, typhoid bacilli, coli communis, chicken cholera, fowl enteritis, and pus-producing organisms.

Diagrams drawn from the microscope and illustrating the following:—

The life history of the anthrax bacillus to the spore and back to the bacillus.

The various forms of tick fever germs within the red blood corpuscles of infected animals.

Charts and diagrams illustrating the results of tick eradication work in the United States of America.

Diagrams and charts illustrating how milk becomes contaminated on the farm, and the necessity for pasteurising all milk and dairy products before being fed to calves and pigs.

Museum specimens illustrating manifestations of various animal diseases, including tuberculosis, actinomycosis, pleuro-pneumonia, tick fever, blackleg, swine fever, and other disorders.

WOOL SECTION.

The versatility of Queensland as a woolgrowing State was evidenced by the different types and characteristics of the wools on exhibition. These were specially selected to illustrate the differences exercised by "environment," and were also indicative of the fact that wools of the highest standard of quality are produced here. A special exhibit was made of samples of wool from stud flocks, and of

PLATE 20.—DEPARTMENTAL DISPLAY, NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

1. Stock Institute.
2. Corridor, showing Grasses and Sugar-cane.

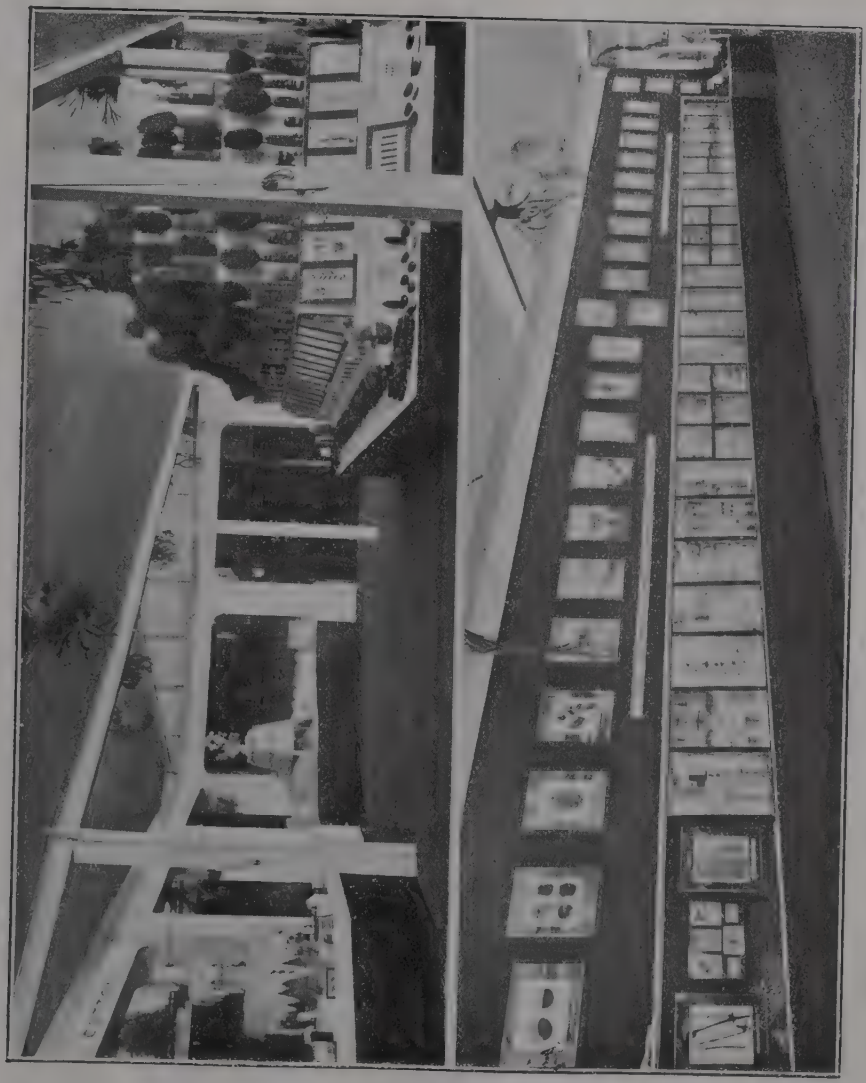


PLATE 21.—DEPARTMENTAL DISPLAY, NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.
1. Interior of Court, showing Cotton and General Agriculture.
2. Bureau of Entomology.

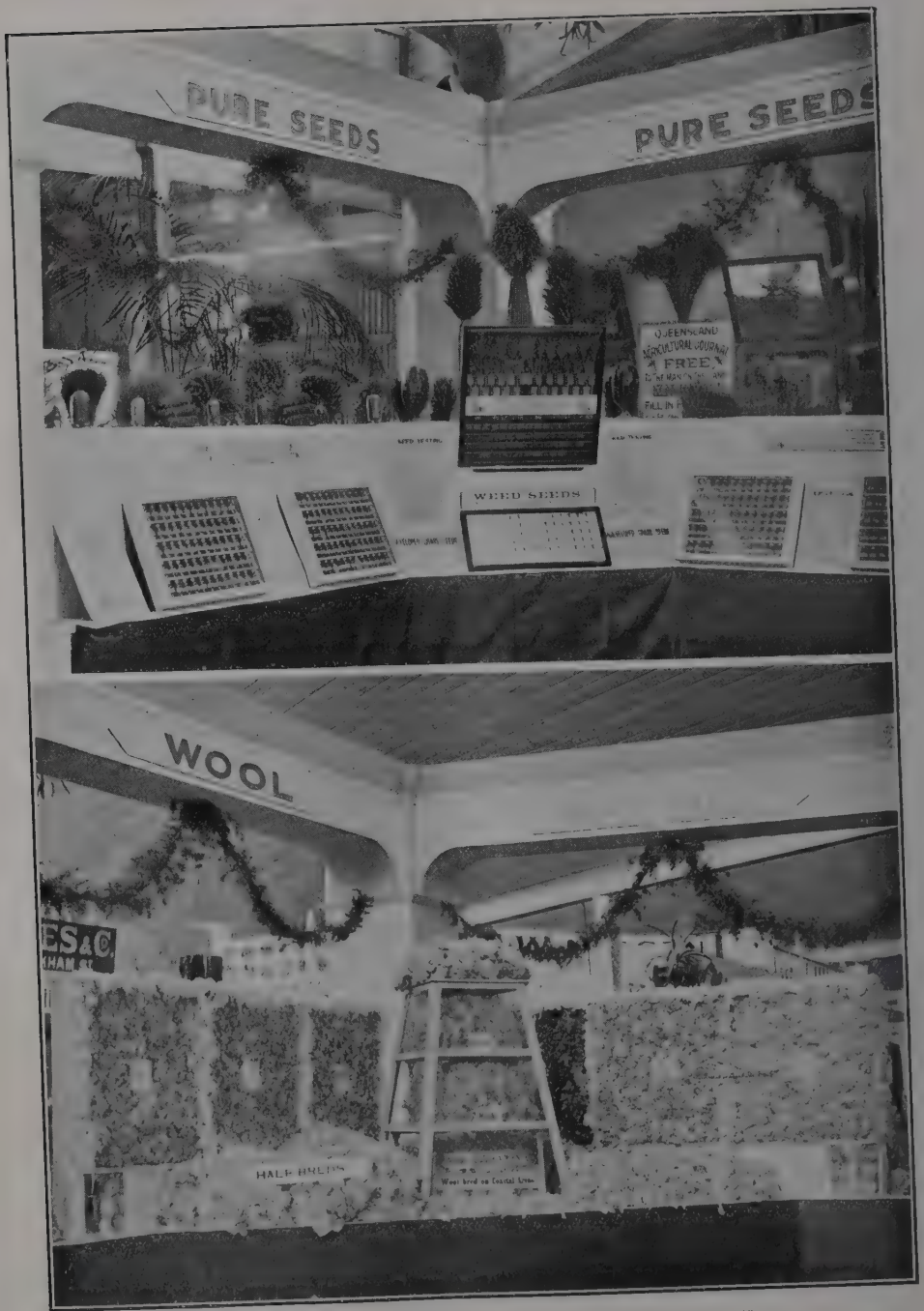


PLATE 22.—DEPARTMENTAL DISPLAY, NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

1. Pure Seeds Bureau.
2. Sheep and Wool Bureau.

Photo. Dept. of Agriculture and Stock.]

PLATE 23.—EXHIBIT OF COTTON AND BY-PRODUCTS—NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

Corriedale wool from sheep in Western Queensland, which proves that this and other British breeds will even thrive side by side with the Merino; and the quality of the wool does not suffer by comparison with that raised even in Victoria and New Zealand. Educational interest was added to the exhibit by the display on cards of practical information and advice on the treatment of sheep fly, the preparation of drenches for stomach worms, and other parasites.

BOTANICAL DIVISION.

The work of the botanical section was represented by collections of grasses, forage plants, and weeds and plants poisonous to stock. In all cases attention was drawn to the fact that this division is always willing to name and report on any specimens of weeds, grasses, trees, and other growths forwarded by farmers or others for identification.

Grasses.—Queensland has always had a reputation for the richness of its pastures, and the comprehensive collection of indigenous grasses and forage plants staged by the Department bore testimony that such has been well earned.

Among the andropogons are the far-famed blue grasses; these are of particular value on account of their palatability and nutritious qualities, some of the larger sorts such as *Andropogon annulatus* and the tassel blue grass being especially noteworthy; as a whole, however, they are not particularly drought-resistant. The genus Astrebla comprises the highly esteemed Mitchell grasses, of which at least four very distinct kinds occur in Queensland. The chief characteristic of these and some other inland species of grasses and herbage are not only their very great nutritive value but the tenacity of life they possess, their drought-resistant qualities, and the rapid way in which they recover and respond to falls of rain, even after long periods of drought, their value in this respect being nothing short of marvellous. It is doubtful if these qualities are to be found to the same extent in the plants of any other country. Among the star grasses are several species esteemed for their fodder value. These belong to the same genus (Chloris) as the imported Rhodes grass. The genus Anthistiria contains several sorts of the kangaroo grasses, and a near ally of them is the Flinders grass, one of the most nutritious of the Western grasses—palatable both green and dry. Quite an array of panic grasses was on exhibit, and grasses of this genus are generally highly esteemed. Beautiful grasses of various species of Eragrostis, or love grasses, though perhaps containing none of great outstanding value, are useful in mixed pastures, like many others of secondary importance. The button grasses and the crowfoot are of cosmopolitan distribution; of the former the annual sort is very highly valued as a sheep fodder. Several native species of paspalum were shown, and among them were some of considerable importance, particularly as fodders in the more tropical parts. The native sorghums are large-growing, rather coarse grasses, but both horses and cattle do well on them and relish the fodder yielded, especially when cut and fed as a forage crop. Coastal grasses were represented by the coast couch, couch spinifex, and others useful as sand-binders on the sand dunes, and as mud-binders on salt flats and estuarine areas, as well as for fodder in such places. Of grasses especially adapted for wet or swampy situations, especial attention was drawn to the water couch, rice grass, *Panicum proliferum*, *Panicum obseptum* (an especially good water grass), and two sorts of Chamæraphic swamp couches.

In addition to fodders, several of the larger grasses yield material suitable for paper pulp, and in this connection the blady grass or lalang, and the common reed (Phragmites) have received some attention, and may yet have a considerable value in this respect in the near future.

Edible Trees and Shrubs.—Among the more remarkable and valuable economic features of the Australian vegetation is the number of shrubs and trees of dried inland "scrubs" and open country that are edible for stock. The collection shown proved interesting to stockowners, pastoralists, and agriculturists generally. Among the many sorts that may be especially noted are the mulga, kurrajong, apple-tree, wild orange, native pomegranate or bumble tree, emu bush, whitewood, weeping myall, cattle bush, cotton bush, and various species of saltbushes. All these and others have helped to keep stock not only alive but in good condition during long spells of dry weather. The conservation, propagation, and further utilisation of these valuable plants is a matter of national importance. They are particularly valuable in prickly-pear areas, and the fine condition of cattle that sometimes come off pear country in drought periods is due almost entirely to them, these edible trees and shrubs yielding nutritive elements not found in the pear.

Weeds.—On the central trophy was displayed a collection of weeds, special attention being directed to those harmful to stock in any way, such as the thorn apples (*Datura* spp.), pimpernel, heart-leaf poison bush, and peach-leaf poison bush.

MAIZE.

The section devoted to this cereal called attention to what may rightfully be termed "The King of Grains." The average aggregate yield of maize in the State, taken over a period of years, exceeds 3,000,000 bushels annually, the produce of approximately 149,000 acres, and at times upwards of 4,000,000 bushels are harvested. The average yield per acre still leaves much to be desired and there is room for improvement both in quantity and quality of grain, and effort is being directed by the Department to the standardising of types and to the improvement of individual crop yields. Consequently the selection of seed maize of this character, calculated to suit Queensland conditions, ranks among the foremost of the Agricultural Department's activities.

For several years past the Department, by adopting a policy of seed propagation plots, has been able to offer to growers at reasonable rates graded seed of improved varieties and types of maize. That this action is appreciated is shown by the increased demand for such seed, with a consequent improvement in yields and quality of grain throughout many of the maizegrowing portions of the State and instances are on record where yields have exceeded 100 bushels per acre under field conditions. Standard varieties of maize were exhibited in this section, and proved their high educational value.

Specimen ears showing good, bad, and indifferent types were prominently displayed, and were explained by means of clearly printed labels in large type, drawing attention to the qualities to be valued, or avoided, in each individual ear, so that this section of the Departmental exhibit might be of the highest educational interest and value to growers.

SORGHUMS.

No more popular crop is grown for stock-feeding purposes than sorghum, of which many varieties exist. The most wonderful drought-resisting qualities of this class of fodder, together with its nutritive value, commends it to the dairy farmer, particularly in dry districts, as a standby in preference to maize, when pastures are failing. For the purpose of ensilage-making and providing a bulk ration for dairy stock, it has few equals. Certain varieties have strong frost-resistant qualities, and may be sown in late summer to provide a standover crop of bulky succulent fodder in the early winter months, especially in those districts where only light frosts are experienced.

Grain Sorghums.—Whilst not so universally grown, these are fast coming into more general use for purposes of food for horses, cattle, pigs, and poultry. Their ability to produce grain under conditions which would be fatal to maize justifies their cultivation by all owners of stock.

Instances have been reported from the Darling Downs where the cultivation of feterita has supplanted that of maize for purposes of horse feed, with results entirely in favour of this variety of grain sorghum.

Poultry-farmers invariably report favourably on this class of grain, and in one instance, on a large poultry farm, unqualified success was attained by feeding the birds entirely with this grain.

Millions of bushels of grain sorghums are raised annually in the United States of America by farmers who recognise the economic value of this crop.

With a view to improvement in the varieties of grain sorghums already introduced into Queensland, several varieties have been imported from the Sudan and United States of America. These sorghums have already been tried in various districts, and although the recently introduced varieties are not yet acclimatised, many have given satisfactory results. Specimen bottles of seeds, showing a range in size and colouring, were on exhibition; also numerous samples of seedheads to illustrate the prolific nature of the crop.

Analytical charts indicating the food values of the several varieties occupied a prominent position, and go to prove that the analytical chemist plays an important part in determining the relative value of these grains for stock-feeding purposes.

WHEATS.

This section was of unusual interest to the wheatgrowers of the State, as the 1920 crop marked a most important period in the history of the production of this cereal in Queensland, as it proved to be the largest ever harvested—something over 4,000,000 bushels. This was the first occasion also on which it was found necessary to formulate a wheat pool for the purposes of handling and marketing the crop on co-operative lines.

The display of new crossbred wheats, in conjunction with the results of milling and analytical trials, was representative of the work of breeding and selecting types of wheat suitable for this State. This work is now being carried out at the Roma State Farm, where, for the season 1920, some record yields of wheat were obtained with many of the varieties now under observation. In order that none but suitable wheats (both from the growers' and millers' standpoint) may be introduced into

Photo. Dept. of Agriculture and Stock.]

PLATE 24.—THE "QUEENSLAND AGRICULTURAL JOURNAL" CORNER.

Photo. Department of Agriculture and Stock, Brisbane.]

PLATE 25.—A DISPLAY OF QUEENSLAND FRUITS BY THE QUEENSLAND FRUITGROWERS' ASSOCIATION—NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

Photo. by Department of Agriculture and Stock, Brisbane.]

PLATE 26.—DISPLAY OF FRUIT PRODUCTS BY THE SAILORS AND SOLDIERS PRODUCE ASSOCIATION, WOOMBYE—NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

Photo. Department of Agriculture and Stock, Brisbane.]

PLATE 27.—EXHIBIT OF PRODUCTS BY THE STATE CANNERY—NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

general cultivation by the Department of Agriculture, careful analytical and milling tests are conducted in the laboratory for the purpose of ascertaining the nutritive food values of individual wheats. Comparative field tests are also being carried out to ascertain their suitability under normal and adverse conditions of growth. Thus it is possible to ascertain to the fullest extent the general characteristics and value of a variety before its liberation for general use.

Few growers of this necessary cereal probably recognise the care and patience demanded of the wheatbreeder in his endeavour to introduce an improved variety of wheat. The delicate operation and necessary skill which attend cross-fertilisation, the successful raising of the plant from seed obtained by the crossing of two varieties, the selection of a type from the resulting plants and its ultimate observation and fixation, culminate in subsequent trials over larger plots under varying field conditions, until by repeated tests certain new and improved types are produced, which in turn are submitted to the chemist for the final determination of their milling and nutritive qualities. Having passed this routine satisfactorily, the new variety is tested in different districts and under varying soil conditions before it is considered worthy or otherwise to be brought into general cultivation. Of the many hundreds of varieties produced, few reach the stage of being classed amongst the useful wheats of the world. In wheatbreeding, it is decidedly the "survival of the fittest."

MISCELLANEOUS FARM AND GARDEN SEEDS.

Due prominence cannot always be given in a combined display, such as that staged, to individual exhibits that in many instances represent important industries, such as the growing of malting and Californian brewing types of barley, which is carried on in a fairly large way on the Darling Downs, and the growing of canary seed, a crop which of late years has come into much favour with farmers, also on the same tract of country.

Another bird seed crop of recent introduction, as far as the commercial utilisation of the seed is concerned, is French millet, a summer-growing variety, all the more valuable on this account in case of a failure of or of the necessity for supplementing the canary seed crop. One feature which claims attention on the part of these two crops and of others of kindred character—like liberty, Japanese, and Manchurian millets—is their excellence as green crops and for making into hay.

The value of different forms of artificial fodder, and the wisdom of cultivating a variety of crops which may be used for this purpose, is freely acknowledged by the dairyman and pigbreeder who has the prosperity of his business at heart.

Numerous specimen sheaves of plants and of seeds which have proved valuable, either alone or in combination with other crops, for stock purposes were displayed. Nature in Queensland is at times "wondrous kind" in the matter of providing its abundance of natural pastures and herbage; but the stockowner as a class is rather prone to disregard the lessons of the drought, and of the fact that a multiplicity of crops can be readily grown in normal seasons. Perhaps no better inspiration can be found as an incentive to progress and to a safer competence than the word "provide," which should be indelibly stamped on every barn door and silo throughout the State.

Some well-grown samples of flax (linseed) were exhibited as an illustration of the fact that the crop can be produced in moist seasons. Although Victoria is the only State possessing a flax mill, there is a movement on foot here to test the growth of linseed as a commercial proposition, notably near Toowoomba, so that, should results warrant the establishment of such a mill, there will be a means at hand to effectively cope with the crop on a co-operative treatment basis.

Cotton.—Public attention has lately been focussed on this crop, as being peculiarly suited to conditions in Queensland, and from the specimens, both of seed cotton and lint, exhibited, it was seen that this State is fully capable of producing cotton of the best quality. With a view of extending its cultivation, the Government is advancing 5½d. per lb. to all growers of seed cotton, for a further period of two years, actually up to 30th June, 1923. Last season's crop was the heaviest recorded in Queensland for a considerable period, and to the present date the Department of Agriculture and Stock has received on behalf of the growers, for ginning purposes, approximately 710,000 lb. of seed cotton. Late last month 664 bales of cotton, weighing approximately 50 tons, were shipped to Liverpool by the s.s. "Westmoreland," and additional shipments are expected to be made in the near future.

In the course of the past season the Department initiated a scheme of seed selection with a view to the propagation of improved strains, and in connection with this work plots have been established in several districts.

Sweet Potatoes.—Special mention is demanded by this section, dealing as it does with a crop largely grown throughout Queensland, and which plays a useful part on the farm for stock-feeding purposes.

The sweet potato ranks high as a starch producer, and as a source of supply of power alcohol.

For some time the Department of Agriculture has been engaged in placing the classification and testing of sweet potatoes on a more satisfactory basis, and, with this in view, propagation plots were established for raising the several varieties under observation. Considerable progress has been made in this direction and in the compilation of data, and recently analytical tests were conducted to ascertain their respective nutritive qualities, and it has been shown in the comparative trials that some of the larger varieties are capable of affording heavy yields—upwards of 30 tons to the acre.

The exhibit comprised nearly fifty varieties of potatoes, and the characteristics and respective starch production of each was clearly set out in tabulated form on cards in close proximity to the tubers. Specimen leaves also of each kind, specially mounted for the purpose, were also shown.

Sudan Grass.—This popular variety of the sorghum family, of comparatively recent introduction into Queensland from the Bureau of Plant Industry in U.S.A., is commencing to show reversions in type and characteristics amounting to a pronounced loss of productivity of individual plants.

With a view of carrying out certain seed improvement work with special strains of this plant, selections have been made at Roma State Farm, where this fodder has been under close observation since its introduction.

The specimens on exhibition proved the value of careful and systematic seed selection for hay and fodder purposes, and served as an object lesson to growers.

Individual plants were also shown, to illustrate the varieties and reversions to be met with in commercial crops of this "grass."

Cowpeas.—An interesting and educational exhibit was staged in that section devoted to cowpeas, showing the results obtained by cross-breeding experiments at Roma State Farm.

As a summer crop (in localities and on soils unsuited to the growth of lucerne), and one which plays an important part in the restoration of humus to the soil, cowpeas have few, if any, equals. Apart from that, it forms a valuable food, in a "cured" condition, for milch cows and working horses, being extremely rich in protein.

The benefits accruing from the ploughing-in of a crop of cowpeas on heavy soils are fully recognised, particularly on sugar lands, where the crop is highly valued as a soil renovator and for supplying nitrogen and vegetable matter.

Cowpeas are aso particularly valuable in connection with pig-raising, being prized for fattening off animals under the paddock system.

PURE SEEDS SECTION.

The exhibit of 240 varieties of agricultural and vegetable seeds, and a named collection of the 90 weed seeds most frequently found in impure samples, directed attention to the work of the Pure Seeds and Stock Foods Branch of the Department.

The importance of having seeds tested, before sowing, will be realised when it is stated that during the year ended 30th June, 1921, out of every hundred samples of Rhodes grass seed examined, thirty-five had a germination of less than 20 per cent. In every hundred samples of lucerne seed, nine samples contained more than the prescribed amount of weed seeds or inert matter. An idea as to what 1 per cent. by weight of a weed seed means will be more clearly understood when it is realised that 1 per cent. of darnel in 1 lb. of oats means the buyer would sow 390 seeds of this weed. One per cent. of oriental rocket equals no less than 17,900 seeds in 1 lb.

Queensland produces a larger quantity of millets, lucerne, Sudan grass, and other seeds than is usually supposed, and there is much to be said in favour of seed grown within the State. This, however, requires to be cleaned with as much care as that produced elsewhere, and farmers would do well to ascertain the percentage of purity and germination of their own seed, as well as that purchased from a neighbour. Particular attention is directed to the using of ungraded seeds, some of which may contain seeds of a poisonous nature, such as *Datura stramonium*. These find their way into chaff and other stock foods, and may lead to serious loss of stock.

Buyers of both stock foods and seeds should let quality, rather than price, be their guide, and in the case of any doubt as to the goods purchased, write to the Department without delay, so that the matter may be investigated whilst the goods are intact and the facts fresh in the memory of both buyer and seller.

It cannot be too widely known that buyers whose main source of income is derived from agricultural pursuits may send samples of seeds for analysis, no charge being made provided the seeds were purchased as seeds for sowing, and the following particulars given:—

(1) Vendor's name and address;
(2) Name of seed;
(3) Quantity purchased;
(4) Locality where the seed is to be sown; and
(5) Name and address of purchaser.

The weight of samples sent should not be less than 8 oz. of oats, cowpeas, maize, &c., 4 oz. of sorghum, Sudan grass, panicum, millet, lucerne, &c., and 2 oz. of Rhodes and paspalum grasses. If the result of the examination is required for purposes of sale a fee of 2s. 6d. is charged.

ECONOMIC ENTOMOLOGY AND PLANT PATHOLOGY.

The Division of Entomology and Vegetable Pathology, under Mr. Henry Tryon, exhibited objects of unique interest, as illustrative of its educational activities, all of which have been prepared by his assistants, Messrs. Edmund and Hubert Jarvis, and are alike expositions of scientific work and artistic skill.

The display embraced three different groups—

(1) Economic insects, life histories;
(2) Plant diseases, colour portrayals; and
(3) Insectivorous birds—stomach contents;

in each of which, samples from the Departmental collections were on view.

The insectivorous bird section, four large cases, relating to some fifty birds and about thirty different kinds, illustrated the procedure followed and results secured in examining the contents of the birds' stomachs, and indicated the actual food partaken of shortly prior to death, and the extent to which insects enter into its dietary. On any question then that arises as to a bird being actually insectivorous, and as to the insects it consumes, it yields evidence that cannot be gainsaid.

The group illustrating disease occurrence comprised a selection of coloured nature prints based on photographs (taken by the photographic artist—Mr. Mobsby—and his assistant), and aimed at the portrayal of plant-maladies as the growers see them. The twenty-four pictures on view illustrated maladies of citrus (orange and lemon), coffee, banana, apple, grape, potato, cabbage, lucerne, and maize. Another method used in making manifest the appearance, action, and effect of plant-disease was shown in a special case devoted to the Irish blight of the potato.

The economic entomology (life histories) group, was of striking interest, and was quite unique in its way. It comprised thirty cases, illustrating the life-phases of upwards of seventy different insects, the injuries that the several plants they attack evince, and in many cases their parasites and other natural enemies. These illustrations comprised actual specimens of the insects themselves, coloured drawings of them, both natural size and enlarged, and specimens illustrating their depredations; and in the case of fruits, models of wax. This series also comprised some stock pests, including beautifully depicted figures of the nine sheep-blowflies, and the so-called poisonous caterpillar of cattle (*Pterygophorus uniformis*). Among plant-destroyers may be mentioned Tryon's fruit fly, with twelve of the cultivated fruits it is wont to destroy; the yellow maize moth and the eleven plants and fruits it injures; thirty-nine insects attacking the orange, including twelve of the scale-insects associated in this work; the ladybird, the flea beetle, the tuber moth, the green caterpillar injuriously related to the potato, the cutworm, the diamond moth, the stem worm (*Hellula undalis*) and the pyralid (*Godaracomalis*) of the cabbage, the blue weevil, and the web-worm of the sweet potato, the bean fly, weevils of pea and bean species, the pumpkin beetle, the army worm (*Leucania unipunta*) of cereals, the grain weevil, the grain moth (*Sitrodrepa cerealtela*), and the flour moth (*Ephestia kuehniella*).

Whilst the cotton insects were represented by an illustrative exhibit of the four Queensland sap-sucking species, there was also a case showing species of those remarkable leaf-eating insects, the phasmidæ or spectre insects.

Not the least important feature in the display of the Entomological Branch related to a single injurious insect. This exhibit was by J. L. Froggatt, B.Sc., entomologist in charge of banana beetle borer investigations. It comprised numerous examples of the two sexes of *Cosmopolites sordidus* (the insect in question) and its eggs—both free and *in situ*—a case especially devoted to the weevil's life history; and again, portions of banana corm and stem that served to manifest the extent as well as the nature of this pest's depredations.

QUEENSLAND AGRICULTURAL COLLEGE.

This section was of educational interest, and illustrated certain phases of the instructional work imparted to students. Prominence was given to exhibits of cheese, butter, and dairy produce generally; to examples of carpentry, and of blacksmithing and saddlery, representing industrial sections, a knowledge of which is of much importance to the man who has to wrest a living from the land.

A variety of farm produce, and of wool raised and classed at the College, was also displayed.

A special section of the trophy was devoted to fodder conservation and the uses of different classes of farm-grown fodder in conjunction with concentrates, more particularly with crushed cotton seed, as quantities of cotton seed are now available in Queensland and offers a cheap and nutritive adjunct for stock-feeding purposes.

Photo. by Dept. of Agriculture and Stock.]

PLATE 28.—COMPLETE WORKING SECTION OF A MODERN DEHYDRATOR—NATIONAL ASSOCIATION EXHIBITION, BRISBANE, 1921.

Photo. Department of Agriculture and Stock, Brisbane.]

PLATE 29.—QUEENSLAND AGRICULTURAL COLLEGE CHAMPION GUERNSEY BULL "SURPRISE OF GRON."

Photo. Department of Agriculture and Stock, Brisbane.]

PLATE 30.—QUEENSLAND AGRICULTURAL COLLEGE FORMER CHAMPION FRIESIAN COW "PRIM."

DISTRICT EXHIBITS.

"A" GRADE

The district exhibits were well worthy of the regions represented. The West Moreton display was a most comprehensive one, and covered the whole field of activity in local primary and secondary production—Ipswich, Esk, Toogoolawah, Lowood, Marburg, Boonah, and Rosewood being the chief contributing centres. The Wide Bay and Burnett had a very fine court in which products from every sub-district were well to the fore—Maryborough, Bundaberg, Gayndah, South Burnett, Gympie, Mary Valley, Kin Kin, and Cooran all sending comprehensive exhibits. The Darling Downs entered the lists for the first time since 1918, and made an excellent show of products from every centre from Toowoomba to Texas.

Following are the details of the competition:—

	Possible Points.	Wide Bay and Burnett.	Darling Downs.	West Moreton.
(1) DAIRY PRODUCE (210)—				
Butter, 1 box	90	84	78	83
Milk, condensed, concentrated, or dried	40	..	28	36
Cheese, 1 cwt.	60	45	45	48
Eggs	20	5	18	15
	210	134	169	182
(2) FOODS (185)—				
Hams and bacon	50	44	45	46
Rolled and smoked beef and mutton	20	5	12	17
Smallgoods and sausages, if smoked or preserved	10	4	8	9
Fish—Smoked, preserved, and canned	10	3	7	2
Canned meats	25	..	10	20
Lard, tallow, and animal oils	20	5	15	17
All butchers' by-products, not included in any other part of scale of points	10	..	8	8
Honey, and its by-products	20	14	18	15
Confectionery	10	6	8	5
Bread, biscuits, scones, and cakes	10	..	7	2
	185	81	138	141
(3) FRUITS, VEGETABLES, AND ROOTS (Fresh and preserved) (195)—				
Fresh fruits—all kinds	60	54	39	50
Preserved fruit, jams, &c.	30	18	27	20
Dried fruits	10	5½	9	4
Fresh Vegetables—all kinds, except potatoes	25	9	22	19
Prepared and dried vegetables, pickles, sauces, &c.	10	5	7	6
Potatoes	40	25	25	30
Roots—all kinds—and their products, arrowroot, cassava meals, &c.	14	10	10	8
Cocoanuts, peanuts, and other nuts	6	4	3	2
	195	130½	142	139
(4) GRAIN, &c. (150)—				
Wheat, meals prepared therefrom	50	33	43	23
Maize	50	30	40	44
Flour, &c.	10	6	8	..
Oats, rye, rice, and their meals	30	21	25	15
Maizena, &c.	10	4	7	..
	150	94	123	82
(5) MANUFACTURES AND TRADES (155)—				
All woodwork	30	20	23	28
All metal and ironwork	30	26	23	24
Leather and all leather work and tanning	20	11	17	15
Manufactured woollen and cotton fibre	30	..	10	30
All tinwork	10	8	6	7
Artificial manures	10	9	3	6
Brooms and brushes	10	2	8	2
Manufactures not otherwise enumerated	15	7	12½	14
	155	83	102½	126

DISTRICT EXHIBITS—*continued.*

—	Possible Points.	Wide Bay and Burnett.	Darling Downs.	West Moreton.
(6) MINERALS AND BUILDING MATERIALS (100)—				
Gold, silver, and precious stones	25	13	13	8
Coal, iron, other minerals, and salt	30	13	15	19
Stone, bricks, cement, marble, terracotta	20	12	14	18
Woods—dressed and undressed	25	22	20	25
	100	60	62	70
(7) TROPICAL PRODUCTS (150)—				
Sugar-cane	60	52	2	25
Sugar (raw and refined)	20	18	..	4
Rum, spirits, and by-products	10	3	6	10
Coffee (raw and manufactured), tea, and spices	10	4	3	5
Cotton (raw) and by-products	30	20	10	15
Rubber	10	..	..	..
Oils (vegetable)	10	5	..	5
	150	102	21	64
(8) WINES, &c. (25)—				
Wines	15	3	10	7
Aerated and mineral spa water	10	6	10	7
	25	9	20	14
(9) TOBACCO (20)—				
Tobacco (cigar and pipe) in leaf	20	2	15	6
(10) HAY, CHAFF, &c. (170)—				
Oaten, wheaten, lucerne, and other hay	30	15	20	25
Grasses and their seeds	7	3	6	4½
Oaten, wheaten, lucerne, and other chaffs	50	25	40	38
Ensilage and other prepared cattle fodder	20	10	10	15
Sorghum and millets	10	4	6	6
Commercial fibres (raw and manufactured)	10	7	8	6
Pumpkins and other green fodder	10	6	8	8
Hemp and flax	10	5	8	2
Broom millet	10	5	5	7
Farm seed	13	6	11	7
	170	86½	122	118½
(11) WOOL, &c. (110)—				
Scoured wool	40	35	25	30
Greasy wool	60	50	48	49
Mohair	10	10	7	9
	110	95	80	88
(12) ENLARGED PHOTOGRAPHS	5	1	5	5
(13) EFFECTIVE ARRANGEMENT (80)—				
Comprehensiveness of view	30	10	30	20
Arrangement of sectional stands	15	8	15	12
Effective ticketing	20	2	20	15
General finish	15	8	15	12
	80	28	80	59
Totals	1,555	906	1,079½	1,094½

SUMMARY.

—	Wide Bay and Burnett.	Darling Downs.	West Moreton.
No. 1, Dairy produce (210)	134	169	182
No. 2, Foods (185)	81	138	141
No. 3, Fruits, vegetables, and roots (195)	130½	142	139
No. 4, Grain, &c. (150)	94	123	82
No. 5, Manufactures and trades (155)	83	102½	126
No. 6, Minerals and building materials (100)	60	62	70
No. 7, Tropical products (150)	102	21	64
No. 8, Wines, &c. (25)	9	20	14
No. 9, Tobacco (20)	2	15	6
No. 10, Hay, chaff, &c. (170)	86½	122	118½
No. 11, Wool, &c. (110)	95	80	88
No. 12, Enlarged photographs (5)	1	5	5
No. 13, Effective arrangement (80)	28	80	59
Total (1,555)	906	1,079½	1,094½

"B" GRADE.

The Northern Darling Downs won the "B" Grade competition in the district exhibit with a total of 794 points. Maranoa was second with 774 points, and Kingaroy third with 765 points. This was the first time the winners had competed. The district comprises Dalby, Chinchilla, Bakingboard, and adjacent localities.

The following are the awards:—

—	Possible Points.	Kingaroy.	Gympie.	Northern Darling Downs.	Maranoa.
(1) DAIRY PRODUCE (170)—					
Butter	90	83	83	80	79
Cheese	60	51	..	50	46
Eggs	20	15	16	15	10
	170	149	99	145	135
(2) FOODS (120)—					
Hams, bacon, rolled and smoked beef and mutton	50	36	25	30	32
Fish—smoked	10	..	6	1	4
Lard, tallow, and animal oils	15	12	7	10	10
Honey, and its by-products	25	14	15	12	11
Confectionery (home-made)	10	6	4	8	6
Biscuits, bread, cakes, and scones (home-made)	10	9	6	6	6
	120	77	63	67	69
(3) FRUITS, VEGETABLES, AND ROOTS—					
Fresh and preserved (190)—					
Fresh fruits—all kinds	60	35	50	40	36
Preserved fruits and jams, &c., prepared by farmer	20	14	18	10	13
Dried fruit, prepared by farmer	5	3½	3½	4	4½
Fresh vegetables—All kinds except potatoes	25	17	14	20	18
Preserved and dried vegetables, pickles, sauces, &c.	10	7½	8½	7	7
Potatoes	40	30	27	22	27
Roots—all kinds—and their products, arrowroot, cassava meal, &c.	10	6	3	3	5
Cocoanuts, peanuts, and other nuts	10	6	2	3	3
Vegetable seeds	10	8	7	4	6
	190	127	138	118	119½

"B" GRADE—*continued.*

—	Possible Points.	Kingaroy.	Gympie.	Northern Darling Downs.	Maranoa.
(4) GRAIN, &c. (150)—					
Wheat	50	15	15	30	43
Flour	10	5	3	8½	7½
Maize	50	42	35	36	38
Maizena, meals, starch, glucose, &c.	10	4	2	4	..
Oats, barley, malt, and pearl barley, and their meals	30	18	9	18	14
	150	84	64	96½	102½
(5) WOODS (40)—					
Dressed and undressed	25	18	20	23	18
Wattle bark	15	14	13	14	10
	40	32	33	37	28
(6) HIDES (10)—					
Free from offensive smell	10	6	6	7½	6½
(7) TROPICAL PRODUCTS (100)—					
Sugar-cane	60	10	45	..	..
Coffee, tea, and spices	10	1	1	..	..
Cotton (raw) and by-products	30	8	10	8	15
	100	19	56	8	15
(8) MINERALS (55)—					
Gold, silver, and precious stones	25	7	13	..	7
Coal, iron, and other minerals, and salt	30	5	9	11	18
	55	12	22	11	25
(9) TOBACCO (20)—					
Tobacco (cigar and pipe), in leaf	20	5	6	8	10
(10) HAY, CHAFF, &c. (170)—					
Lucerne, oaten, wheaten, and other hay	30	18	13	19	21
Grasses and their seeds	7	6	5	7	3½
Oaten, wheaten, lucerne, and other chaffs	50	25	25	28	23
Ensilage and other prepared cattle fodder	20	15	12	9	6
Sorghum and millets	10	8	5	5	6
Commercial fibres	10	7	6	..	8
Pumpkins and other green fodder	10	7	6	8	7
Hemp and flax	10	7	5	4	8
Farm seeds	13	10	6	6	4
Broom millet	10	5	7	8	8
	170	108	90	94	94½
(11) WOOL, &c. (110)—					
Scoured wool	40	35	30	40	35
Greasy wool	60	45	48	55	60
Mohair	10	7	8	9	10
	110	87	86	104	105
(12) ENLARGED PHOTOGRAPHS	5	2	1	5	3

"B" GRADE—*continued.*

—	Possible Points.	Kingaroy.	Gympie.	Northern Darling Downs.	Maranoa.
(13) LADIES' WORK (30)—					
Needlework, knitting, fine art ..	15	10	11	10	14
School work, maps, writing, &c., for pupils of schools in the district	15	11	8	13	10
	30	21	19	23	24
(14) EFFECTIVE ARRANGEMENT (80)—					
Comprehensiveness of view ..	30	15	30	26	8
Arrangement of sectional stands	15	8	15	12	4
Effective ticketing	20	5	15	20	20
General finish	15	8	15	12	5
	80	36	75	70	37
Grand totals	1,250	765	758	794	774

SUMMARY.

1. Dairy produce	170	149	99	146	135
2. Foods	120	77	63	67	69
3. Fruits and vegetables	190	127	138	118	119½
4. Grain	150	84	64	96½	102½
5. Woods	40	32	33	37	28
6. Hides	10	6	6	7½	6½
7. Tropical products	100	19	56	8	15
8. Minerals	55	12	22	11	25
9. Tobacco	20	5	6	8	10
10. Hay and chaff	170	108	90	94	94½
11. Wool	110	87	86	104	105
12. Enlarged photographs	5	2	1	5	3
13. Ladies' work	30	21	19	23	24
14. Effective arrangement	80	36	75	70	37
Totals	1,250	765	758	794	774

ONE-FARM EXHIBITS.

There were four competitors in the one-farm section, three of whom made their first entry as exhibitors. The result was a win for Mr. K. Haag, of Teviotville, Fassifern.

Following are the details:—

—	Possible Points.	G. E. Pullen.	K. Haag.	W. Allen.	J. Donges.
(1) DAIRY PRODUCE (50)—					
Butter, 6 lb.	25	19	17	22	17
Cheese, 1 large and 2 small ..	20	9	13	..	10
Eggs, 1 dozen	5	3	3	4½	2
	50	31	33	26½	29
(2) FOODS (65)—					
Hams, 15 lb.; bacon, 15 lb. ..	20	17	9	15	12
Corned, smoked, and spiced beef and mutton, 10 lb.	10	8	5	7	6
Honey, 12 lb.	10	4	7	..	6
Beeswax, 6 lb.	5	5	5	4	5
Bread, 2 loaves; scones, 1 dozen	5	2	3	5	4
Confectionery and sweets, 3 lb. ..	5	1	5	3	4
Cakes, &c.	5	1	4	3	3
Lard, tallow, oils	5	3	3	3	3
	65	41	41	40	43

ONE-FARM EXHIBITS—*continued.*

—	Possible Points.	G. E. Pullen.	K. Haag.	W. Allen.	J. Donges.
(3) FRUITS, VEGETABLES, AND ROOTS—fresh and preserved (143)—					
Fresh fruits, all kinds	25	10	14	11	12
Dried fruits	10	4	5	4	8
Preserved fruits and jams	15	5	14	12	12
Fresh vegetables	15	10	12	9	6
Pickles, sauces, &c.	15	4	14	11	11
Potatoes, 56 lb. (or collection and roots)	25	16	23	18	17
Table pumpkins, squashes, and marrows, 56 lb.	10	6	10	9	8
Cocoanuts and nuts	3	1	2	2	3
Vegetable and garden seeds, 5 lb.	5	..	5	4	5
Arrowroot, 10 lb.	5	..	5	5	4
Cassava, 3 lb.	5	..	..	3	..
Ginger, 3 lb.	5	..	..	..	..
Sugar beet, 3 lb.	5	3	..	..	3
	143	59	104	88	89
(4) GRAIN, &c. (65)—					
Wheat	25	12	8	4	20
Maize	20	7	16	10	18
Barley	20	16	14	7	14
	65	35	38	21	52
(5) TROPICAL PRODUCTS (45)—					
Sugar-cane, 24 stalks or 1 stool	30	5	12	20	..
Cotton, in seed, 10 lb., long staple	10	5	5	9	4
Coffee, 10 lb.	5	..	..	3	..
	45	10	17	32	4
(6) TOBACCO leaf, dried, 5 lb.	10	..	..	8	3
(7) HAY, CHAFF, &c. (117)—					
Hay, oaten, wheaten, lucerne, and other varieties	20	6	14	14	18
Grasses and their seeds, including canary	10	4	10	8	9
Chaff, oaten, wheaten, lucerne, and other varieties	20	11	19	12	13
Ensilage, any form	15	..	14	..	12
Cattle fodder, pumpkins, and green fodder	15	12	15	14	14
Sorghum and millet	10	5	3	10	10
Hemp, 5 lb.	5	..	4	4	..
Flax, 5 lb.	5	..	4	4	4
Cowpea seed, 7 lb.	7	6	6	5	6
Broom millet	10	..	9	9	8
	117	44	103	80	94
(8) WOOL (25)—					
Greasy, 5 fleeces	20	17	17	16	17
Mohair	5	..	..	4	..
	25	17	17	20	17
(9) DRINKS, &c. (10)—					
Temperance drinks, 6 bottles	10	5	7	6	4

ONE-FARM EXHIBITS—*continued.*

—	Possible Points.	G. E. Pullen.	K. Haag.	W. Allen.	J. Donges.
(10) WOMEN'S AND CHILDREN'S WORK (30)—					
Needlework, knitting	7	3	7	7	4
Fine arts	3	..	3	2	1
School work, maps, writing, &c.	10	7	..	6	..
Fancy work	10	6	9	8	3
	30	16	19	23	8
(11) Miscellaneous articles of commercial value	5	3	4	4	5
(12) Plants and flowers, in pots ..	5	2	5	3	3
(13) Time and labour saving useful articles, made on the farm ..	10	10	6	8	6
(14) Effective arrangement of exhibits	10	7	9	8	10
(15) Arrangement of stand ..	5	3	5	4	5
(16) Effective ticketing	5	4	5	4	5
(17) General finish	10	5	8	8	10
	50	34	42	39	44
Grand totals	610	292	421	383½	387

MILKING TESTS.

Subjoined are the details of the milking tests conducted in connection with the Exhibition. Judges: Messrs. R. W. Winks and L. F. Anderson, Brisbane.

COW, 4 YEARS OLD AND OVER, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

—	—	Milk. Lb.	Commercial Butter.	Pts. Butter Fat, 24 Hours.	Lact. Points.	Total Points.
Lawrence's Charmer 2nd of City View	M.	22·3	1·180	..	..	..
	E.	19·5	1·451	..	..	..
	M.	16·5	·978	..	..	..
	E.	17·11	1·307	..	..	..
		75·8	4·916	39·32	10	49·32
A. Pickel's Royal 4th of Blacklands	M.	20·14	1·640	..	..	..
	E.	18·7	1·545	..	..	..
	M.	18·12	1·361	..	..	..
	E.	18·4	1·437	..	..	..
		76·5	5·983	47·86	..	47·86
Nestle and Anglo-Swiss Condensed Milk Co.'s Maggie 3rd of Nestles	M.	29·0	·876	..	..	..
	E.	32·12	1·380	..	..	..
	M.	29·14	1·036	..	..	..
	E.	27·14	1·265	..	..	..
		119·8	4·557	36·4	..	36·4
M. Lawrence's Princess of City View	M.	22·10	·975	..	..	..
	E.	19·11	·967	..	..	..
	M.	22·0	·920	..	..	..
	E.	18·0	1·040	..	..	..
		82·5	3·902	31·21	3·4	34·61
B. O'Connor's Tulip IV. of Hill View	M.	25·8	·945	..	..	..
	E.	24·6	1·162	..	..	..
	M.	25·5	1·092	..	..	..
	E.	23·12	1,100	..	..	..
		98·15	4·299	34·38	..	34·38
B. O'Connor's Wakeful of Oakvale	M.	25·12	·803	..	..	..
	E.	26·0	1·280	..	..	..
	M.	24·14	1·105	..	..	..
	E.	24·4	1·080	..	..	..
		100·14	4·268	34·14	..	34·14
P. Moore's Lovely of Sunnyside ..	M.	23 9	·757	..	..	..
	E.	16·15	1·010	..	..	..
	M.	21·7	1·201	..	..	..
	E.	21·0	1·010	..	..	..
		82·13	3·978	31·82	1·9	33·72

MILKING TESTS—*continued*

—	—	Milk. Lb.	Commercial Butter.	Pts. Butter Fat, 24 Hours.	Lact. Points.	Total Points.
S. H. Hosking's Margaret Anglin 2nd of Berry	M.	21·3	·616	..	..	..
	E.	21·8	·870	..	..	..
	M.	22·10	·684	..	..	..
	E.	22·4	·930	..	..	..
		87·9	3·100	24·8	8·9	33·7
B. O'Connor's Dahlia 2nd of Hillview	M.	28·15	1·028	..	..	..
	E.	26·4	·977	..	..	..
	M.	29·10	1·029	..	..	..
	E.	27·7	1·013	..	..	..
		112·4	4·047	32·36	..	32·36
Livingston Bros.' Young Duchess 4th	M.	24·6	·841	..	..	..
	E.	20·1	·932	..	..	..
	M.	26·6	1·135	..	..	..
	E.	21·8	·980	..	..	..
		92·5	3·888	31·1	1·2	32·3
A. Pickel's Jean V. of Blacklands	M.	22·11	·861	..	..	..
	E.	19·13	·634	..	..	..
	M.	22·1	·741	..	..	..
	E.	18·9	·637	..	..	..
		83·2	2·873	22·98	8·9	31·87
S. H. Hosking's Duchess of Hanover of Berry	M.	28·4	·755	..	..	..
	E.	28·4	·947	..	..	..
	M.	30·0	·940	..	..	..
	E.	28·15	1·138	..	..	..
		115·7	3·780	30·24	..	30·24
Jackson and Schofield's Butter Maid 2nd	M.	16·10	·695	..	..	..
	E.	16·3	·859	..	..	..
	M.	17·4	·677	..	..	..
	E.	16·1	·792	..	..	..
		66·2	3·023	24·19	1·3	25·5

COW, 4 YEARS AND OVER, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

—	—	Milk. Lb.	Test.	Commercial Butter. Lb.
A. Pickel's Royal 4th of Blacklands	M.	20·14	6·7	1·640
	E.	18·7	7·1	1·545
	M.	18·12	6·2	1·361
	E.	18·4	6·7	1·437
		76·5	..	5·983
M. Lawrence's Charmer II. of City View	M.	22·3	4·5	1·180
	E.	19·5	6·4	1·451
	M.	16·5	5·1	·978
	E.	17·11	6·3	1·307
		75·8	..	4·916

MILKING TESTS—*continued.*

—	—	Milk. Lb.	Test.	Commercial Butter. Lb.
Nestle and Anglo-Swiss Condensed Milk Co.'s Maggie III. of Nestles	M.	29·0	2·6	·876
	E.	32·12	3·6	1·380
	M.	29·14	3·0	1·036
	E.	27·14	3·9	1·265
		119·8	..	4·557
B. O'Connor's Tulip IV. of Hillview	M.	25·8	3·2	·945
	E.	24·6	4·1	1·162
	M.	25·5	3·7	1·092
	E.	23·12	4·0	1·100
		98·15	..	4·299
B. O'Connor's Wakeful of Oakvale	M.	25·12	2·7	·803
	E.	26·0	4·2	1·280
	M.	24·14	3·8	1·105
	E.	24·4	3·8	1·080
		100·14	..	4·268
B. O'Connor's Dahlia II. of Hillview	M.	28·15	3·1	1·028
	E.	26·4	3·2	·977
	M.	29·10	3·0	1·029
	E.	27·7	3·2	1·013
		112·4	..	4·047
P. Moore's Lovely of Sunnyside	M.	23·9	2·8	·757
	E.	16·13	5·1	1·610
	M.	21·7	4·8	1·201
	E.	21·0	4·1	1·010
		82·13	..	3·978
Livingstone Bros.' Young Duchess IV.	M.	24·6	3·0	·841
	E.	20·1	4·0	·932
	M.	26·6	3·7	1·135
	E.	21·8	3·9	·980
		92·5	..	3·888
S. H. Hosking's Duchess of Hanover of Berry ..	M.	28·4	2·3	·755
	E.	28·4	2·9	·947
	M.	30·0	2·7	·940
	E.	28·15	3·4	1·138
		115·7	..	3·780
(UNDER STANDARD.)				
Jackson and Schofield's Butter Maid II.	M.	16·10	3·6	·695
	E.	16·3	4·5	·859
	M.	17·4	3·4	·677
	E.	16·1	4·2	·792
		66·2	..	3·023

MILKING TESTS—*continued.*

COW OR HEIFER, UNDER 4 YEARS, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

—	—	Milk.	Test.	Commercial Butter.
		Lb.		Lb.
E. Burton's Oxford Golden Buttercup.	M.	20·9	4·2	1·002
	E.	19·13	5·0	1·160
	M.	19·10	3·9	·895
	E.	14·13	7·0	1·225
		74·13	..	4·282
M. Lawrence's Present of City View	M.	19·4	4·0	·890
	E.	18·0	5·4	1·150
	M.	17·14	3·5	·725
	E.	19·1	4·9	1·093
		74·3	..	3·858
E. Burton's Oxford Noble Dot II.	M.	15·12	3·7	·680
	E.	17·4	6·4	1·297
	M.	15·9	5·2	·953
	E.	14·0	5·2	·860
		62·9	..	3·790
M. Lawrence's Red Duchess III. of City View ..	M.	18·14	2·6	·570
	E.	17·6	3·2	·641
	M.	20·7	3·4	·803
	E.	19·0	3·8	·850
		75·11	..	2·864
B. O'Connor's Bessie of Oakvale	M.	16·3	3·5	·657
	E.	15·12	3·6	·660
	M.	17·12	3·6	·740
	E.	16·3	3·6	·677
		65·14	..	2·734
Jackson and Schofield's Irene of Bexley	M.	9·15	3·8	·437
	E.	10·6	4·9	·588
	M.	12·10	4·6	·680
	E.	11·8	5·1	·690
		44·7	..	2·395

COW OR HEIFER, UNDER 4 YEARS, AVERAGING THE GREATEST DAILY YIELD OF BUTTER FAT FOR 48 HOURS.

—	—	Milk.	Commercial Butter.	Points Butter Fat, 24 Hours.	Lactation Points.	Total Points.
		Lb.				
R. Mear's Tulip of Morden ..	M.	20·7	·977	..	..	..
	E.	17·3	·847	..	..	..
	M.	20·15	·967	..	..	..
	E.	16·8	·760	..	..	..
		75·1	3·551	28·40	8·8	37·20
E. Burton's Oxford Golden Buttercup	M.	20·9	1·002	..	..	..
	E.	19·13	1·160	..	..	..
	M.	19·10	·895	..	..	..
	E.	14·13	1·225	..	..	..
		74·13	4·282	34·25	..	34·25

MILKING TESTS—*continued.*

—	—	Milk.	Commercial Butter.	Points Butter Fat, 24 Hours.	Lactation Points.	Total Points.
		Lb.				
B. O'Connor's Bessie of Oakvale	M.	16·3	·657	..	..	..
	E.	15·12	·660	..	..	..
	M.	17·12	·740	..	..	..
	E.	16·3	·677	..	..	..
		65·14	2·734	21·87	9·2	31·07
M. Lawrence's Present of City View	M.	19·4	·890	..	..	..
	E.	18·0	1·150	..	..	..
	M.	17·14	·725	..	..	..
	E.	19·1	1·093	..	..	..
		71·3	3·858	30·86	..	30·86
E. Burton's Oxford Noble Dot II.	M.	15·12	·680	..	..	..
	E.	17·4	1·297	..	..	..
	M.	15·9	·953	..	..	..
	E.	14·0	·860	..	..	..
		62·9	3·790	30·32	..	30·32
A. Pickels' Model of Blacklands..	M.	15·2	·593	..	..	..
	E.	14·7	·657	..	..	..
	M.	14·6	·585	..	..	..
	E.	14·7	·637	..	..	..
		58·6	2·472	19·77	9·3	29·07
M. Lawrence's 2nd of City View..	M.	10·14	·455	..	..	..
	E.	9·5	·359	..	..	..
	M.	11·10	·472	..	..	..
	E.	10·6	·435	..	..	..
		42·3	1·721	13·76	..	13·76

COW, UNDER 4 YEARS, GIVING BEST BUTTER FAT RESULTS, AND COMPETING IN THE TWO PREVIOUS SECTIONS, WITH ALLOWANCE FOR LACTATION POINTS IN THE LAST SECTION. THE POINTS SECURED BY THE VARIOUS COMPETITORS WERE SIMILAR TO THOSE IN THE CLASSES MENTIONED.

	Total points.
R. Mear's Tulip of Morden	37·20
R. Burton's Oxford Golden Buttercup	34·25
B. O'Connor's Bessie of Oakvale	31·07

COW YIELDING LARGEST SUPPLY OF MILK IN 48 HOURS.

—	—	Milk, Lb.	Test.
Nestle and Anglo-Swiss Condensed Milk Co.'s Maggie III. of Nestle's	M.	29·0	2·6
	E.	32·12	3·6
	M.	29·14	3·0
	E.	27·14	3·9
Total weight		119·8	..
B. O'Connor's Dahlia 2nd of Hillview	M.	28·15	3·1
	E.	26·4	3·2
	M.	29·10	3·0
	E.	27·7	3·2
Total weight		112·4	..

MILKING TESTS—*continued.*

—	—	Milk, Lb.	Test.
Livingstone Bros.' Young Duchess IV.	M.	24·6	3·0
	E.	20·1	4·0
	M.	26·6	3·7
	E.	21·8	3·9
Total weight	..	92·5	..
S. H. Hosking's Duchess of Hanover of Berry	M.	28·4	2·3
	E.	28·4	2·9
	M.	30·0	2·7
	E.	28·15	3·4
Total weight..	..	115·7	..
(Above under Standard.)			
P. Moore's Lovely of Sunnyside	M.	23·9	2·8
	E.	16·13	5·1
	M.	21·7	4·8
	E.	21·0	4·1
Total weight	..	82·13	..
M. Lawrence's Princess of City View	M.	22·10	3·7
	E.	19·11	4·2
	M.	22·0	3·6
	E.	18·0	4·9
Total weight	..	82·5	..
M. Lawrence's Charmer II. of City View	M.	22·3	4·5
	E.	19·5	6·4
	M.	16·5	5·1
	E.	17·11	6·3
Total weight	..	75·8	..

Special competition for Cows, 4 years old and over, averaging the greatest daily yield of butter fat for 48 hours, for which competition was conducted in the second of the foregoing classes.

	Commercial Butter.
A. Pickels' Royal 4th of Blacklands	5·983
M. Lawrence's Charmer 2nd of City View	4·916
Nestle and Anglo-Swiss Condensed Milk Co.'s Maggie 3rd of Nestles ..	4·557

ROYAL NATIONAL CHAMPION BUTTER FAT TEST FOR COW (ANY BREEDING), AVERAGING THE GREATEST YIELD OF BUTTER FAT, 48 HOURS (UNDER THE BABCOCK TEST), AND WHICH HAS BEEN THE PROPERTY OF THE EXHIBITOR THREE MONTHS BEFORE THE ENTRY. Special Prize of £25, and a cash prize of £2 2s. to the winner.

—	—	Milk, Lb.	Commercial Butter.	Points Butter Fat, 24 hours.	Lactation Points.	Total Points.
M. Lawrence's Charmer 2nd of City View (Illawarra Milking Shorthorn)	M.	22·3	1·180	..	..	..
	E.	19·5	1·451	..	..	..
	M.	16·5	·978	..	..	..
	E.	17·11	1·307	..	..	..
		75·8	4·916	39·32	10	49·32
Winner, 1920—						
B. O'Connor's Charm of Glenthorn (Illawarra)	..	121·8	6·76	..	..	..

CHAMPION BUTTER TEST.

The Royal National Champion Butter Fat Test for a £25 special prize and a cash prize of £2 2s. yearly to the winner, creates considerable interest among dairymen. The Prize is given for the cow of any breed averaging the greatest daily yield of butter fat for 48 hours under the Babcock test. This year the prize was won by Mr. Lawrence's Illawarra Milking Shorthorn, Charmer 2nd of City View. Previous winners were :— 1912, D. Dunn's Blossom III. ; 1913, McIntyre Bros.' Fancy ; 1914, A. Pickels' Florrie of Blacklands ; 1915, C. Bloss's Canary ; 1916, D. Dunn's Blossom III. ; 1917, Marquardt Bros.' Champion ; 1918, H. Benbow's Joyce ; 1919, no show held ; 1920, B. O'Connor's Charm of Glenthorn.

HOME MILKING.

Cows or heifers in all competitions averaging the greatest daily yield of butter fat for 48 hours, under Babcock test, milk to contain on an average not less than 3 per cent. of butter fat :—

Ayrshires.

—	—	Milk. Lb.	Test.	Commercial Butter Fat.
J. N. O. Anderson's Jeanette R. 3rd of Ivercauld ..	M.	26	3·8	1·16
	E.	25½	4·2	1·25
	M.	24½	5·2	1·49
	E.	25½	3·6	1·07
		101½	..	4·97
Livingstone Bros.' Young Duchess 4th	M.	31	3·0	1·08
	E.	23½	4·0	1·09
	M.	30	3 0	1·04
	E.	25	3·9	1·14
		109½	..	4·35

Jerseys.

T. Mullen's Lady Lass 3rd	M.	21	4·8	1·18
	E.	20	5·2	1·22
	M.	20	5·2	1·22
	E.	24	5·0	1·42
		85	..	5·04
T. Mullen's Aldans Rosie	M.	20¼	5·8	1·385
	E.	21	4·5	1·11
	M.	22¼	5·4	1·415
	E.	21	4·4	1·08
		84½	..	4·990

Illawarra Milking Shorthorns.

B. O'Connor's Charm of Glenthorn	M.	37·5	4·35	1·91
	E.	30·0	5·3	1·87
	M.	36·5	4·4	1·88
	E.	30·0	5·2	1·9
		134	..	7·56
M. Lawrence's Charm of 2nd of City View	E.	28½	3·6	1·19
	M.	30½	3·0	1·055
	N.	32	4·0	1·50
	E.	26½	4·4	1·365
	M.	30½	3·0	1·055
	N.	29	3·9	1·32
		177	..	7·485

HOME MILKING—*continued.*

—	—	Milk. Lb.	Test.	Commercial Butter Fat.
Friesians.				
P. P. Falt's Oakley Noreen	M.	31	4·2	1·53
	E.	30	5·0	1·77
	M.	30	5·6	1·98
	E.	31	5·0	1·82
		122	..	7·10
P. P. Falt's Dairymaid	M.	31	3·6	1·30
	E.	29	3·8	1·29
	M.	33	4·0	1·54
	E.	29	4·1	1·40
		122	..	5·33
G. Newman's Colantha Queen Segis	M.	33½	3·4	1·315
	E.	27½	4·3	1·385
..	M.	32½	3·5	1·32
	E.	26½	4·3	1·335
		120	..	5·355
Grindles Ltd.'s Colantha Johanna Creamelle ..	M.	28	3·45	1·13
	E.	32	3·00	1·11
	M.	31	3·00	1·08
	E.	29	4·70	1·60
		120	..	4·92

A special prize, awarded to the Queensland Stud Book cow or heifer of the four breeds in the Home Milking Competitions giving the best butter fat results, was awarded to B. O'Connor's Charm of Glenthorne (Illawarra).

BACON AND HAMS.

Mr. G. S. Stening (Sydney) judged the bacon, hams, and by-products, in the dairy produce section. J. C. Hutton Propty., Ltd., Brisbane, won the competitions in factory bacon, factory-cured hams, smoked sausages, and lard, gaining a high percentage of marks. The awards in the section are as follows :—

BACON, SIX SIDES, FACTORY CURED.

—	Flavour.	Texture and Firmness.	Portion of Fat and Lean.	Butchering and Finish.	Smoking.	Colour.	Total.
Possible points	45	10	10	10	10	15	100
J. C. Hutton Propty., Ltd., Brisbane	43	9	9½	7	9	13½	91
J. C. Hutton Propty., Ltd., Brisbane	43½	9	8½	7	9	13½	90½
Queensland Co-operative Bacon Co., Ltd., Murarrie	43½	8	9	8	8½	13	90
J. C. Hutton Propty., Ltd., Canterbury, N.S.W.	43	7	8	7	8	13	86
Foley Bros., Lismore, N.S.W. ..	42	6½	9	7	8	12½	85
BACON, FARMERS', TWO SIDES, CURED.							
D. Dunn, Valley View, Beaudesert	42	8	8	7	7	13	85

BACON AND HAMS—*continued.*

—	Flavour.	Texture and Firmness.	Portion of Fat and Lean.	Butchering and Finish.	Smoking.	Colour.	Total.
HAMS, SIX, FACTORY CURED.							
J. C. Hutton, Propty. Ltd., Brisbane	43½	9	9	8½	9	13	92
J. C. Hutton Propty., Ltd., Brisbane	43½	8½	9	8½	9	13	91½
Queensland Co-operative Bacon Co., Ltd., Murarrie	43	8	8½	8½	9½	12½	90
J. C. Hutton Propty., Ltd., Canterbury, N.S.W.	43	7½	8½	8	9	12½	88½
Foley Bros., Ltd., Lismore, N.S.W.	42½	6½	7	8½	9	13	86½
HAMS, FARMERS' TWO BEST CURED.							
D. Dunn, Valley View, Beaudesert	42½	8	9	8	7	12½	87

LARD, IN BLADDERS, 14 Lb.

—	Flavour.	Texture.	Colour.	Finish and appearance.	Total.
Possible points	40	25	25	10	100
J. C. Hutton Propty., Ltd., Brisbane ..	37½	25	24½	10	97
Queensland Co-operative Bacon Co., Ltd., Murarrie	38	24½	23½	10	96
J. C. Hutton Propty., Ltd., Brisbane	37	20	24	10	91
Foley Bros., Ltd., Lismore, N.S.W.	36½	24	23	7	90

SAUSAGE, SMOKED, 14 Lb.

J. C. Hutton Propty., Ltd., Brisbane, 1.
Queensland Co-operative Bacon Co., Ltd., Murarrie, 2.

HEN EGGS, DOZEN, TO BE JUDGED BY WEIGHT.

J. G. Argo, Chermside, 1.
A. J. Cain, Spring Hill, 2.

JUDGE'S FAVOURABLE CRITICISM.

Satisfaction with the section was expressed by the judge, who remarked that the exhibits were of a fairly high order, and showed an improvement, both in quality and texture, on those of last year. The winning exhibit in bacon sides was exceptionally good, and would be difficult to excel, in so far as flavour and texture were concerned. Points were lost, however, in butchering, mainly caused by inferior scalding. The ham classes, too, were particularly good, and compared favourably with those of other shows. The minor exhibits, sausages and lard, were very fine in quality.

THE APIARY SECTION.

The Queensland Beekeepers' Association has benefited the apiary industry immensely by advocating and demonstrating the employment of modern methods and the application of science to honey production and extraction. Queensland honey ranks with the world's best for colour, flavour, and density. The industry is capable of great expansion, as many tons go to waste for lack of bees to gather it and beekeepers to harvest it. The competition in the extracted honey classes at the Show was very keen. An educative exhibit was a sectional view of a modern beehive, with a numbered descriptive chart attached. Two others by the same exhibitor, Mr. A. J. Wheeler, attracted much attention. One was a case showing the number of uses to which beeswax may be put, and a second demonstrated the medicinal value of honey.

THE AWARDS.

Extracted Honey.—Light: A. Smith 1, A. Douglas 2, A Gambling 3; golden: A. Gambling 1 and 2, P. Ward 3; dark: A. Gambling 1 and 2, W. K. Holmans 3; fine grain: A. Gambling 1, A. T. Baker 2, P. Ward 3; coarse: P. Ward 1 and 2, A. T. Baker, 3; comb and extracted: A. Douglas 1, S. L. Uhlmann 2, P. Ward 3; solid: P. Ward 1, A. T. Baker 2, A. J. Wheeler 3.; novice class: S. L. Uhlmann. Jar extracted honey: P. Ward. Comb honey, 12 1 lb. sections: A. Gambling. Frame of comb honey: P. Ward. Not less than 100 square inches: P. Ward. Beeswax, natural yellow: P. Ward; white: A. Smith. 4 lb. tablets: S. L. Uhlmann. Yellow tablets: P. Ward. Trophy form: A. Gambling. Modes of using beeswax: A. J. Wheeler. Trophy of apiary products: A. T. Baker 1, A. Gambling 2, A. Smith 3. Hives, &c.—Observatory hive: A. J. Wheeler; foundation for comb and sections: P. Ward. Honey cookery.—Honey vinegar: P. Ward. Collection of confectionery and cakes: Mrs. A. Pitkeathly. Articles showing medical use of honey: A. J. Wheeler. Champion prize for honey exhibited in classes 1, 2, 3, 8, and 9: Alex. Smith, Redbank.

FARM PRODUCE—THE AWARDS.

(Judges: Agricultural produce, Mr. H. C. Quodling; cotton, rubber, oils, &c., Mr. D. Jones.)

Cereals.—Maize, large yellow, period of maturity 5 to 6 months: J. H. Littleton 1 and 2; Yellow Dent (any district variety other than Hawkesbury champion or so-called Golden King): H. Franke; yellow peg tooth type (to include so-called "lady's finger," and long thin grains of this kind): H. C. Harvey 1, H. Franke 2; small yellow, period of maturity 100 to 120 days, Early Leaming (to include "Star" and "Gold Standard" Leaming): H. Franke 1, A. E. Price 2; Early Yellow Dent (or other distinct varieties): H. Franke; so-called 90-day, period of maturity 90 to 100 days: H Franke; white varieties, large white (Hickory King not eligible): H. Franke; Hickory King: C. Behrendorff; Boone County White (Silvermine, or other distinct white type): A. Loweke; Brazilian white: C. Behrendorff; red varieties, Sydney Red: H. Franke; Red Butcher: J. Stenzel 1 and 2; small Early Red (to include red-coloured Leaming, or any other early variety, with a distinct shade of red): H. Franke 1, H. C. Harvey 2; any variety, 10 lb.: H. Franke; popcorn any variety, 10 lb.: J. Donges; maize "ears," medium yellow: H. Franke; small yellow: H. Franke; any white variety: A. Loweke 1, H. Franke 2; red: H. Franke; red, small grain (early): A. E. Price 1, H. Franke 2; popcorn: J. Donges; champion best exhibit maize, yellow: J. H. Littleton; white champion: H. Franke. Wheat, medium, strong, flour wheat: Wm. Auchter; weak flour wheat, Wm. Auchter; grand champion prize best exhibit wheat, 2 bags, any variety: Wm. Bridge 1, G. Alexander 2 and 3. Barley, malting barley, 1 bushel (Chevalier or Battledoor type): Wm. Taylor 1, E. W. Jackson 2; malting barley, 1 bushel (Sea of Azov type): Wm. Taylor; Cape barley, 1 bushel: D. Hammond, 2; champion malting barley: Wm. Taylor. Oats, Algerian, or Sunrise oats, 1 bushel: C. Behrendorff 1, H. Franke 2. Hay, chaff, and ensilage, lucerne hay, best, dry, green coloured: B. C. Bell 1, J. Campbell 2; lucerne hay, sweated: J. Campbell; oaten hay: C. Behrendorff 1, J. Donges 2; wheaten hay: Wm. Auchter; Soudan grass hay: H. Franke 2; millet or panicum hay, any kind: H. Franke 2; 3 sheaves oaten hay, Algerian: H. W. Berlin 1, J. Donges 2; 3 sheaves oaten hay, Tartarian: H. W. Berlin; 3 sheaves wheaten hay: Wm. Auchter 1, H. W. Berlin 2; chaff, lucerne chaff, 1 bag, cut from prime, dry, green-coloured hay: H. W. Berlin 1, B. C. Bell 2; lucerne chaff, 1 bag, cut from prime, sweated hay: J. Campbell 1, J. Donges 2; wheaten chaff, 1 bag, best cut, screened, and bright, cut from prime hay: Leslie Auchter 1, Wm. Auchter 2; "canary" chaff, 1 bag, best cut, screened, and bright, cut from prime hay: H. Franke 2; Soudan grass, 1 bag, best cut, screened, cut from prime, fine stalked, leafy hay: H. Franke; millet or panicum chaff, 1 bag, any kind, cut from prime hay: K. Haag 1, H. W. Berlin 2; grass hay chaff, 1 bag, any kind, cut from artificial or native grasses: H. Franke 2; wheaten straw chaff, 1 bag: J. Campbell; straw chaff (any other kind): J. Campbell 1, H. Franke 2; ensilage (chaff), approx. 56 lb. maize, or other fodder: C. Behrendorff; green fodder, best collection, suitable for milch cows: H. Franke 1, J. Donges 2; agricultural and market garden seeds, sorghums and millet, grain sorghum non-saccharine), cream, standard or dwarf milo, 30 lb.: H. Franke 2; red Kafir corn, 30 lb.: H. Franke; saccharine, sorghums, saccaline (so-called), 30 lb.: E. J. Keys; sorghum saccharatum, 30 lb.: H. Franke; planter's friend (so-called imphee), 30 lb.: K. Haag 2; Amber cane, 30 lb.: K. Haag; Soudan grass, 30 lb.: H. Franke; panicum and fodder millets, white seeded French millet, 30 lb.: T. Fisher; Japanese millet, 30 lb.: H. W. Berlin 1, K. Haag 2; white panicum, 30 lb.: H. W.

Berlin. Pasture grass seeds.—Lucerne seed, Queensland grown, broad leaf, Hunter River variety, 30 lb.: C. Behrendorff 1, B. C. Bell 2; Sisal hemp fibre, one bundle, 3 to 4 in. in diameter: F. M. Schleger. Beans and peas, cowpeas (black), 30 lb.: K. Haag. Cowpeas (clay coloured), 30 lb.: K Haag. Yorkshire Hero peas or any other variety, 10 lb.: K. Haag. Miscellaneous.—Canary seed of commerce, 30 lb.: E. W. Jackson. Tropical produce.—Sugar-cane, five canes, any kind, with tops on, 16 months and under, grown in red soil: F. M. Schleger. Sugar-cane, 5 canes, any kind, with tops on, 16 months and under, grown in other than red soil: F. M. Schleger 1, Miers, Herman 2. Sugar-cane, 5 canes, any kind, with tops on, standover: F. M. Schleger. Sugar-cane, collection good milling varieties, 3 canes of each variety, with tops on: F. M. Schleger 1, Miers, Herman 2. Sugar-cane, stool, any kind, 16 months and under, standover: F. M. Schleger 1, Miers, Herman 2. Sugar-cane, stool, any kind, standover: F. M. Schleger. Sugar-cane, best 5 sticks D. 1135: F. M. Schleger. Sugar-cane, best 5 sticks, 1900 seedling: F. M. Schleger. Sugar-cane, best 5 sticks, any variety of Queensland or Hambledon seedlings, Badila, D. 1135 and 1900 seedling: F. M. Schleger. Sugar-cane, best 5 sticks, any variety of Queensland or Hambledon seedlings: F. M. Schleger. Cotton, upland, in seed, not less than 10 lb.: J. J. Kakebeeke. "The John Reid Crop," and prizes donated by Mrs. John Reid to encourage cotton cultivation in Queensland: J E. Maddox 1, J. J. Kakebeeke 2. Roots, &c., potatoes, blue varieties, Guyrar blues, coronations, or Commonwealths: T. Fisher 1, Louis Ebert 2. Manhattans: C. Seiler 1, Louis Ebert 2. Brownell, any variety other than Satisfaction: T. Fisher 1, H. Franke 2. Satisfaction: Louis Ebert 1, A. Loweke, 2; Scottish Triumphs: A. Leweke. Best collection, not less than six varieties, each 14 lb.: A. Loweke 1, Louis Ebert 2. Sweets, white table variety: Louis Ebert. Sweets, white cattle variety: Miers, Herman. Sweets, red or pink, table variety: J. S. Seeleither 1, Louis Ebert 2. Champion blue potato: T. Fisher. Champion white potato: A. Loweke. Champion Brownell potato: Louis Ebert. Crown pumpkins, table, 3: J. Seeleither 1, H. C. Harvey 2. Ironbark pumpkins, table, 3: H. C. Harvey 1, A. E. Price 2. Marrows, 3: A. E. Price. Piemelons, 3: J. Seeleither 1, Mrs. P. Newton 2. Arrowroot, 3 stools: Miers, Herman 1, H. Franke 2. chicory, green or dry, 10 lb.: J. Donges. Garlic, 3 lb.: F. Franke. Castor oil bean, any variety, 5 lb.: J. Donges. Swedes purple top, ½ cwt.: H. Franke 1, A. E. Price 2. Swedes, any other variety: H. Franke.

SWINE.

(Judge: Mr. W. Fisher.)

Improved Berkshires.—Boar, 2 years and over: W. J. Warburton's Northgate Item; over 6 months and under 1 year: E. Burton's Oxford King; under 6 months: J. H. Cowen's Cremorne Lad 1, J. H. Cowen's Cremorne Sonny 2; champion Berkshire boar, any age: W. J. Warburton's Northgate Item. Sow, 2 years and over: W. J. Warburton's Glad Eye; 1 year and under 2 years: C. Behrendorff's Brentwood Jill 1, Dr. H. B. Ellerton's Serang Maid 2; over 6 months and under 1 year: Dr. H. B. Ellerton's Goodna Queenie 1, E. Burton's Oxford Pearl 2; under 6 months: E. Burton's Oxford Marie 1, J. H. Cowen's Cremorne Bess 2; any age, with litter: E. Burton's Kilbirnie Lex; champion Berkshire sow: W. J. Warburton's Glad Eye.

Yorkshires.—Boar, 2 years and over: W. J. Warburton's Northgate My Lad 1, Queensland Agricultural College's Even Chance 2; 1 year and under 2 years: W. J. Warburton's Northgate Don 1; 6 months and under 1 year: Queensland Agricultural College; under 6 months, W. J. Warburton's boar; champion Yorkshire boar: W. J. Warburton's Northgate My Lad. Sow, 2 years and over: W. J. Warburton's Northgate My Girl; 1 year and under 2 years: W. J. Warburton's Northgate Glads; 6 months and under 1 year: W. J. Warburton's Trisa; under 6 months: W. J. Warburton's Rosetta; champion Yorkshire sow: W. J. Warburton's Northgate My Girl.

Tamworths.—Boar, 2 years and over: J. H. Whittaker's Meddlesome Duke; 1 year and under 2 years: Queensland Agricultural College's Knowle Chatham; 6 months and under 1 year: T. M. Hewitt; under 6 months: William Dredge's Rufus; champion Tamworth boar J. H. Whittaker's Meddlesome Duke. Sow, 2 years and over: J. H. Whittaker's Knowles Princess; 6 months and under 1 year: Queensland Agricultural College's Rosebank Doris 1, T. M. Hewitt 2; under 6 months: J. H. Whittaker's Knowles Gem 1, J. H. Whittaker's Knowles Pearl 2; champion Tamworth sow: J. H. Whittaker's Knowles Princess.

Poland-China.—Sow, 6 months and under 15 months: T. M. Hewitt; pen of three young boars, under 6 months: T. M. Hewitt; pen of three young sows, under 6 months: T. M. Hewitt.

Miscellaneous.—Special prize, presented by Mr. R. G. Watson, for Queensland-bred pig (sow or boar), under 6 months: E. Burton's Oxford Marie; 3 bacon pigs, any breed, 110 to 140 lb. estimated dressed weight: H. McNeilly 1, J. Fitzgerald 2; 3 porker pigs, 60 to 80 lb.: S. Mison 1, C. Bright 2; sow, with litter, any breed: E. Burton's Kilbirnie Lex; pen of 3 Berkshire sows, under 16 weeks: C. Behrendorff 1, E. Burton 2; pen of 3 Yorkshire sows, under 16 weeks: W. J. Warburton; pen of 3 Yorkshire boars, under 16 weeks: W. J. Warburton.

STUD SHEEP.

(Judge: Mr. Edgar Baynes.)

Lincolns.—Ram, any size: S. E. Pullen; ewe, any age: S. E. Pullen.

English Leicesters.—Ram, any age: S. E. Pullen; ewe, any age: S. E. Pullen.

Romney Marsh.—Ram, any age: S. E. Pullen; ewe, any age: S. E. Pullen.

Corriedales.—Ram, any age: J. H. Fairfax 1 and 2; ewe, any age: J. H. Fairfax 1 and 2.

Shropshires.—Ram, any age: S. E. Pullen; ewe, any age: S. E. Pullen.

BUTTER—EXPORT CLASSES.

The first prize went to the Queensland Farmers' Co-operative Co., Ltd., of Laidley, with 93½ points for salted butter and 92½ points for unsalted butter. The details are as follows :—

ONE BOX (SALTED), 30 DAYS' STORAGE.

—	Flavour.	Texture.	Colour.	Salting.	Packing and finish.	Total.
Possible points	65	20	7	4	4	100
Queensland Farmers' Co-operative Co., Ltd., Laidley	59	19½	7	4	4	93½
Downs Co-operative Dairy Co., Ltd., Toowoomba	58½	19½	7	4	4	93
Murrumbidgee Irrigation Areas, Leeton, N.S.W.	58	19½	7	4	4	92½
Logan and Albert Co-operative Dairy Co., Ltd., Beaudesert	54	19	7	4	4	88
Terror's Creek and Samson Vale Dairy Co., Dayboro	56	19	7	4	3½	89½
Downs Co-operative Co., Ltd., Dalby ..	56	19	7	4	4	90
Downs Co-operative Co., Ltd., Clifton ..	56½	19	7	4	4	90½
Downs Co-operative Co., Ltd., Crow's Nest	57	19	7	4	4	91
Caboolture Co-operative Dairy Co., Ltd. Pomona	56	19	7	3	4	89
Gayndah Co-operative Dairy Co., Ltd., Gayndah	57	19	7	4	3½	90½
Oakey Co-operative Dairy Col, Ltd., Oakey	56½	19	6½	4	4	90
Queensland Farmers' Co-operative Co., Ltd. Booval	57½	19½	7	4	4	92
Queensland Farmers' Co-operative Co., Ltd., Boonah	57½	19½	7	4	4	92
Queensland Farmers' Co-operative Co., Ltd., Grantham	58	19	7	4	4	92

BUTTER—EXPORT CLASSES—*continued.*

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Dorrigo Co-operative Dairy Co. Ltd., Dorrigo, N.S.W.	56½	19	7	4	4	90½
Maryborough Co-operative Dairy Co. Ltd., Maryborough	54	19	7	4	4	88
Maryborough Co-operative Dairy Co. Ltd., Kingaroy	56½	19	7	4	4	90½
Maryborough Co-operative Dairy Co. Ltd., Biggenden	56½	19	7	4	3½	90
Maryborough Co-operative Dairy Co. Ltd., Mundubbera	56	19	7	3	3½	88½
Wide Bay Co-operative Dairy Co. Ltd., Gympie	56	19	7	3½	3½	89½
Wide Bay Co-operative Dairy Co. Ltd., Cooroy	57	19	7	3½	3½	90
Kin Kin Co-operative Dairy Co. Ltd., Kin Kin	56½	19	7	4	3½	90
Warwick Butter and Dairying Co. Ltd., Mill Hill	56	19	7	4	3½	89½
Warwick Butter and Dairying Co. Ltd., Allora	57	19	7	4	3	90
Warwick Butter and Dairying Co. Ltd., Texas	56	18½	7	4	3	88½
Nanango Co-operative Dairy Co. Ltd., Nanango	56	19	7	4	4	90

ONE BOX (UNSALTED), 8 WEEKS' STORAGE.

—	Flavour.	Texture.	Colour.	Packing.	Total.
Possible points	65	24	7	4	100
Queensland Farmers' Co-operative Dairy Co. Ltd., Boonah	58	23½	7	4	92½
Maryborough Co-operative Dairy Co. Ltd., Mundubbera	58	23	7	4	92
Queensland Farmers' Co-operative Co., Booval ..	57½	23	7	4	91½
Logan and Albert Co-operative Dairy Co. Ltd., Beaudesert	57	23	7	4	91
Terror's Creek and Samson Vale Dairy Co., Dayboro	56½	23	7	3½	90
Downs Co-operative Dairy Co. Ltd., Toowoomba	57	22½	7	4	90½
Downs Co-operative Dairy Co. Ltd., Dalby ..	56	23	7	4	90
Caboolture Co-operative Dairy Co. Ltd., Pomona	56	23	7	4	90
Gayndah Co-operative Dairy Co. Ltd., Gayndah	57	23	7	4	91
Oakey Co-operative Dairy Co. Ltd., Oakey ..	56½	23	7	4	90½
Queensland Farmers' Co-operative Co. Ltd., Grantham	57	23	7	4	91
Queensland Farmers' Co-operative Co. Ltd., Laidley	56½	23	7	4	90½
Dorrigo Co-operative Dairy Co. Ltd., Dorrigo, N.S.W.	56	23	7	4	90
Maryborough Co-operative Dairy Co. Ltd., Maryborough	56½	23	7	4	90½
Maryborough Co-operative Dairy Co. Ltd., Kingaroy	56	23	7	4	90

BUTTER—EXPORT CLASSES—*continued.*

—	Flavour.	Texture.	Colour.	Packing.	Total.
Possible points	65	24	7	4	100
Maryborough Co-operative Dairy Co. Ltd., Biggenden	57	23	7	3	90
Wide Bay Co-operative Dairy Co. Ltd., Gympie ..	56	23	7	4	90
Wide Bay Co-operative Dairy Co. Ltd., Cooroy ..	55	23	7	4	89
Kin Kin Co-operative Dairy Co. Ltd., Kin Kin ..	55½	23	7	4	89½
Warwick Butter and Dairying Co. Ltd., Mill Hill ..	56	23	7	4	90
Warwick Butter and Dairying Co. Ltd., Allora ..	55	23	7	3	88
Warwick Butter and Dairying Co. Ltd., Texas ..	55½	23	7	3	88½
Warwick Butter and Dairying Co. Ltd., Goondiwindi	56	23	7	4	90

ONE BOX (SALTED), 8 WEEKS' STORAGE.

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Queensland Farmers' Co-operative Dairy Co. Ltd., Boonah	58½	19	7	4	4	92½
Queensland Farmers' Co-operative Dairy Co., Ltd., Booval	58	19	7	4	4	92
Wide Bay Co-operative Dairy Co. Ltd., Cooroy	57½	19	7	4	4	91½
Logan and Albert Co-operative Dairy Co., Goombungee	57	19	7	4	4	91
Queensland Farmers' Co-operative Dairy Co. Ltd., Grantham	57	19	7	4	4	91
Queensland Farmers' Co-operative Dairy Co. Ltd., Laidley	56½	19	7	4	4	90½
Dorrigo Co-operative Dairy Co. Ltd., Dorrigo, N. S. W.	56½	19	7	4	4	90½
Downs Co-operative Dairy Co., Ltd., Crow's Nest	56½	19	7	4	4	90½
Terror's Creek and Samson Vale Dairy Co., Dayboro	57	19	7	4	3	90
Oakey Co-operative Dairy Co. Ltd., Oakey	56	19	7	4	4	90
Downs Co-operative Dairy Co. Ltd., Toowoomba	56	19	7	4	4	90
Downs Co-operative Dairy Co. Ltd., Dalby	56	19	7	4	4	90
Kin Kin Co-operative Dairy Co. Ltd., Kin Kin	55½	19	7	4	4	89½
Downs Co-operative Dairy Co. Ltd., Clifton	55½	19	7	4	4	89½
Maryborough Co-operative Dairy Co. Ltd., Kingaroy	56	19	7	3½	4	89½
Warwick Butter and Dairying Co. Ltd., Mill Hill	56	19	7	3	4	89
Wide Bay Co-operative Dairy Co. Ltd., Gympie	55	19	7	4	4	89
Maryborough Co-operative Dairy Co. Ltd., Maryborough	55½	19	7	3½	4	89
Gayndah Co-operative Dairy Co. Ltd., Gayndah	55	19	7	4	3½	88½
Maryborough Co-operative Dairy Co. Ltd., Biggenden	55½	19	7	3½	3½	88½
Warwick Butter and Dairying Co. Ltd., Goondiwindi	55	19	7	4	3½	88½
Caboolture Co-operative Dairy Co. Ltd., Pomona	55	19	7	4	3	88
Maryborough Co-operative Dairy Co. Ltd., Mundubbera	54½	19	7	3½	4	88
Warwick Butter and Dairying Co. Ltd., Texas	55	19	6½	4	3½	88
Warwick Butter and Dairying Co. Ltd., Allora	55	18½	7	3	4	87½

BUTTER FOR LOCAL MARKETS.

In the factory butter class (local consumption) the Queensland Farmers' Co-operative Dairy Co., Boonah, came first with 93½ points ; they also secured the special prize of £5 5s. for the factory securing the greatest aggregate number of points in all classes of butter. Caboolture Co-operative Dairy Co., Ltd., Pomona, second, with 93 points ; and Kin Kin Co-operative Dairy Co., Ltd., Kin Kin, third, with 92½ points.

Details are as follows :—

ONE BOX, FACTORY MAKE, LOCAL CONSUMPTION.

—	Flavour.	Texture.	Colour.	Salting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Queensland Farmers' Co-operative Co., Boonah	59½	19	7	4	4	93½
Caboolture Co-operative Dairy Co., Pomona	59	19	7	4	4	93
Kin Kin Co-operative Dairy Co., Kin Kin	58½	19	7	4	4	92½
Maryborough Co-operative Dairy Co., Kingaroy	58	19	7	4	4	92
Warwick Butter and Dairying Co., Goondiwindi	58	19	7	4	4	92
Terror's Creek and Samson Vale Dairy Co., Dayboro	58½	19	7	4	3	91½
Queensland Farmers' Co-operative Co., Laidley	57½	19	7	4	4	91½
Wide Bay Co-operative Dairy Co., Gympie	58	19	7	3½	4	91½
Warwick Butter and Dairying Co., Mill Hill	57½	19	7	4	4	91½
Nanango Co-operative Dairy Co. Ltd., Nanango	57½	19	7	4	4	91½
Logan and Albert Co-operative Dairy Co., Beaudesert	57	19	7	4	4	91
Wide Bay Co-operative Dairy Co., Cooroy	57	19	7	4	4	91
Downs Co-operative Dairy Co., Toowoomba	57½	19	7	3½	4	91
Downs Co-operative Dairy Co., Clifton ..	57	19	7	4	4	91
Astonville Co-operative Dairy Co., Astonville	57	19	7	4	4	91
Queensland Farmers' Co-operative Co., Booval	56½	19	7	4	4	90½
Queensland Farmers' Co-operative Co., Grantham	57	19	7	3½	4	90½
Maryborough Co-operative Dairy Co., Maryborough	57	19	7	3½	4	90½
Warwick Dairy and Butter Co., Allora ..	57	19	7	4	3½	90½
Downs Co-operative Dairy Co., Crow's Nest	56½	19	7	4	4	90½
Gayndah Co-operative Dairy Co., Gayndah	56½	19	7	3½	4	90
Oakey Co-operative Dairy Co., Oakey ..	56	19	7	4	4	90
Maryborough Co-operative Dairy Co., Mundubbera	56	19	7	3½	4	89½
Downs Co-operative Dairy Co., Dalby ..	56	19	7	4	3½	89½
Maryborough Co-operative Dairy Co., Biggenden	55	19	7	3½	3½	88

BUTTER FOR LOCAL MARKETS—*continued.*

GREATEST AGGREGATE NUMBER OF POINTS.

Special prize of £5 5s. for factory securing the greatest aggregate number of points in all classes of butter.

—	Export Butter.	8 Weeks' Storage.	Box Butter.	Fresh Butter.	Total.
Queensland Farmers' Co-operative Co., Boonah ..	92	92½	92½	93½	370½
Queensland Farmers' Co-operative Co., Booval ..	92	91½	92	90½	366
Queensland Farmers' Co-operative Co., Laidley ..	93½	90½	90½	91½	366
Queensland Farmers' Co-operative Co., Grantham	92	91	91	90½	364½
Downs Co-operative Dairy Co., Toowoomba ..	93	90½	90	91	364½
Kin Kin Co-operative Dairy Co., Kin Kin ..	90	89½	89½	90½	361½
Wide Bay Co-operative Dairy Co., Cooroy ..	90	89	91½	91	361½
Logan and Albert Co-operative Dairy Co., Beaudesert	88	91	91	91	361
Terror's Creek and Samson Vale Dairy Co., Dayboro	89½	90	90	91½	361
Oakey Co-operative Dairy Co., Oakey	90	90½	90	90	360½
Caboolture Co-operative Dairy Co., Pomona ..	89	90	88	93	360
Gayndah Co-operative Dairy Co., Gayndah ..	90½	91	88½	90	360
Wide Bay Co-operative Dairy Co., Gympie ..	89½	90	89	91½	360
Warwick Butter and Dairying Co., Mill Hill ..	89½	90	89	91½	360
Downs Co-operative Dairy Co., Dalby	90	90	90	89½	359½
Maryborough Co-operative Dairy Co., Maryborough	88	90½	89	90½	358
Maryborough Co-operative Dairy Co., Mundubbera	88½	92	88	89½	358
Maryborough Co-operative Dairy Co., Biggenden	90	90	88½	88	356½
Warwick Butter and Dairying Co., Allora ..	90	88	87½	90½	356
Maryborough Co-operative Dairy Co., Kingaroy ..	90½	90	89½	92	352
Downs Co-operative Dairy Co., Crow's Nest ..	91	..	90½	90½	272
Downs Co-operative Dairy Co., Clifton	90½	..	89½	91	271
Dorrigo Co-operative Dairy Co., Dorrigo, N.S.W...	90½	90	90	..	271
Warwick Butter and Dairying Co., Goondiwindi	..	90	88½	92	270½
Warwick Butter and Dairying Co., Texas ..	88½	88½	88	..	265

CHEESE—EXPORT CLASSES.

The following are details of the points awarded :—

Two Export Cheeses, 70-80 lb. (not more than three weeks' old prior to storing). White, suitable for English market :—

—	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Goombungee Co-operative Dairy Co., Goombungee	43½	25	15	9	92½
Downs Co-operative Dairy Co. Ltd., Hodgson's Vale	42½	25	15	9½	92
Biddeston Co-operative Dairy Co. Ltd., Wellcamp	42½	25	14½	9½	91½
Kooroongarra Co-operative Dairy Co. Ltd., Kooroongarra	42	25	15	9½	91½
Pittsworth Dairy Co. Ltd., Pittsworth	42	24	15	9½	91
Gayndah Co-operative Dairy Co. Ltd., Byrnestown	43	24	14½	8½	90

CHEESE—EXPORT CLASSES—*continued.*

—	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Greenmount Dairy Co. Ltd., "H." Factory ..	42	24	14½	9½	90
Greenmount Dairy Co. Ltd., "G" Factory ..	42	24	15	9	90
Warwick Butter and Dairying Co. Ltd., Bony Mountain	41	24	14	9	88
Oakey Co-operative Dairy Co. Ltd., Cross Hill ..	41	24	14½	8	87½
Two Export Cheeses, 70-80 lb. (not more than three weeks' old prior to storing). Coloured, suitable for English market :—					
Pittsworth Dairy Co. Ltd., Pittsworth	44	25	15	9½	93½
Downs Co-operative Dairy Co. Ltd., Hodgson's Vale	44½	25	14	9½	93
Pittsworth Dairy Co. Ltd., Brookstead	43	25	15	9½	92½
Goombungee Dairy Co. Ltd., Goombungee ..	43	24½	15	9½	92
Greenmount Dairy Co. Ltd., "H" Factory ..	43	24½	15	9½	92
Greenmount Dairy Co. Ltd., "G" Factory ..	42½	25	15	8½	91
Southbrook Co-operative Dairy Co. Ltd., Southbrook	41	25	15	9	90
Kooroongarra Co-operative Dairy Co. Ltd., Kooroongarra	42	24½	14	9½	90
Warwick Butter and Dairying Co. Ltd., Victoria Hill	41	24½	15	9½	90
Warwick Butter and Dairying Co. Ltd., Bony Mountain	40½	25	15	9	89½
Warwick Butter and Dairying Co. Ltd., Pratten	41	24½	14½	9½	89½
Gayndah Co-operative Dairy Co. Ltd., Byrnestown	41	24	14	9	88
Karrajong Cheese Factory, Jimbour	39	24	14	8½	85½
Oakey Co-operative Dairy Co., Cross Hill ..	40	24	14	8½	85½
Downs Co-operative Dairy Co., Gowrie Junction ..	38	24½	14½	9	86
Biddeston Co-operative Dairy Co., Wellcamp ..	38	24½	14½	8½	85½

SHOW LECTURES.

Dairy cattle breeders and others interested attended in large numbers two informative lectures under the presidency of Mr. W. J. Affleck in the course of Show week.

THE DAIRY PRODUCE ACT.

Mr. E. Graham, Chief Dairy Expert, lectured on the new Dairy Produce Act. He pointed out that it superseded the "*Dairy Produce Acts*, 1904-11." The need for the new legislative measure was occasioned by the advancement that had been made in dairying during the latter years as a result of the improvement and the introduction of additional scientific measures. In framing the Act care was taken to inquire into the measures that governed dairying in other countries. In the main, the 1920 Act contained all that was found useful and beneficial to the industry in the 1904 Act. In addition, some further provisions had been added which it was thought would be for the betterment of the industry. Amongst the principal alterations was that dealing with registrations of dairies. Formerly registration was an annual matter, but under the new Act when a dairy was once registered the registration would remain in force indefinitely. The new Act further required that those engaged in dairy work might be called upon to produce a certificate of good health. Cream manifestly affected by putrefactory decomposition was not to be received for the manufacture into butter, and cream containing more than .66 per cent. of lactic acid should not be classified as first grade in quality for butter-making, and milk containing more than .25 per cent. of lactic acid should not be classified as first-grade quality for cheesemaking. Apparatus for cleaning the hands of the milkers

and udders of the dairy cows was to be provided. A notice of epizootic or contagious disease amongst stock was required. Factories manufacturing dairy produce were required under the Act to distribute any overrun made by them *pro rata* each month amongst those supplying milk or cream. There had been, too, an alteration in the standard for cream for certain months of the year. Those were the principal alterations of the Act. While it was recognised they were to a great extent minor, they should not alarm those who had the interests of the industry at heart, and desired to assist in the maintenance of the good reputation of this State as a producer in dairy foodstuffs.

DISEASES OF DAIRY CATTLE.

The prevention of disease in dairy cattle with special reference to contagious mammitis was dealt with by Mr. McEachern, a qualified veterinary surgeon. In introducing the subject, the lecturer spoke of the importance of the live stock industry. The necessity for healthy, thrifty calves was mentioned, and the various methods of raising calves described. Ailments of calves dealt with included scours, pneumonia, hæmorrhagic septicæmia, and blackleg, and preventive and curative measures were fully explained. Common milk defects were mentioned, and causes given, and some time was devoted to the different forms of mammitis encountered in dairy cows, such as the simple, tubercular, actinomycotic, and contagious. The latter was described as a most disastrous disease, which was of such an insidious character that it was possible for a whole herd to be affected before the owner realised the nature of the trouble. Prevention was better than cure, and if we could check the occurrence of disease by hygienic measures, the country and stockowners would benefit proportionately.

TREATMENT FOR SMALL WORMS IN HORSES.

Sclerostoma Tetracanthum.—This is a small thread-like worm about half an inch long, found chiefly in the large bowel in great numbers. The embryos encyst themselves beneath the mucous membrane. The countless wounds which the worms make in the bowel, and the irritation caused by the encysted larvæ, give rise to enteritis, &c. There is usually associated with this worm another known as the *Sclerostoma equinum*. This worm is about 1¼ inches to 1½ inches long, grey or reddish grey in colour, with a round knobbish head, and tapering to the tail end. The embryos wander into the blood vessels, causing obstructions giving rise to grave complications.

Treatment.—All suspected animals should be purged by administering a dose of physic, such as 5 to 6 drachms of powdered Barbados aloes with one drachm of powdered ginger given as a drench in a pint of thin gruel, or made into a ball with a little soft soap. After the action of the purgative has ceased, they should be given every day, about one hour before their morning feed, the following powder mixed in a couple of handfuls of damped food:—

Antimony tartrate	2 drachms
Powdered sulphate of iron	1 drachm
Powdered gentian	2 drachms
Powdered aniseed	3 drachms

After six doses they should be given a second active purgative, for the smaller horses and ponies not more than 5 drachms of aloes and 1 drachm antimony tartrate should be given. During the treatment the animals should be kept yarded to prevent the contamination of pastures by excreta, which should be gathered up and burnt, and the ground dressed with common salt or quick lime. As infested animals cannot by one course of vermifuges be divested of the larvæ in the cysts and blood vessels, they should be treated at intervals of two or three months. More important than medication is the exclusion of embryos from food and water.

Wherever the *Sclerostoma* have secured a local habitat the land should be put under a rotation of crops, to be laid down in grass again after four or five years. The *Sclerostoma* ova will by this time have hatched out and died a natural death. Where this is impracticable, change the horses to other pastures and depasture the infested land for several years by cattle or sheep, which do not harbour the *Sclerostoma*. In all cases it must be provided that no drainage can come from infested pastures to the clean pastures. Rock salt left in the paddocks for the horses to lick will greatly minimise the chances of infestation.

Pastoral.

THE NODULE PARASITE AND ALLIED WORMS FROM QUEENSLAND CATTLE.

BY PROFESSOR T. HARVEY JOHNSTON, University, Brisbane.

In the "Queensland Agricultural Journal" of December, 1911, the writer gave a brief account of the "worm nodule disease" (*Onchocerciasis*) of Queensland cattle. At that time it was not known that in addition to the parasite, *Onchocerca gibsoni*, Cleland and Johnston, which causes that condition, there were other allied worms infesting our stock. Last year attention was called by M. J. Bancroft and the writer to a second species, which was then identified as *O. bovis*, Pietrre, but which is now regarded as belonging to *O. gutturosa*, Neumann. A third species, *O. lienalis*, Stiles, is reported for the first time as a common parasite of Queensland cattle. Of these, the firstnamed is of very great economic importance; the second of very little; and the third, probably none.

I. ONCHOCERCA GIBSONI, Cleland and Johnston.

The worm nodule parasite has caused very heavy loss to the Queensland meat export trade. Official figures supplied by the Commonwealth authorities (*see* Bulletin No. 2, Institute of Science and Industry, 1917) regarding the number of briskets examined during 1914, 1915, and 1916 in Queensland coastal meatworks show that about 80 per cent. were infected with nodules in North Queensland, 63 per cent. in Central Queensland works, and 70 per cent. (1914, 1915) in south-eastern meatworks. The number of cattle killed in this State during the period averaged about half a million head annually. The actual loss per average carcase of 650 lb. dressed weight intended for export was estimated during 1916 to be about 19s., as about 15 per cent. of the carcase, on an average, had to be removed, owing to its infected condition, before export was permitted by the Commonwealth authorities. Though the part so removed was utilised in other ways, yet the cost of removal and the diminished value of the excised portion involved a loss averaging nearly £1 for each carcase. The worm nodule parasite, then, must have cost Queensland nearly half a million sterling annually during the period referred to. It is only by quoting such figures that the public can be made to realise what a great loss has occurred, and is still occurring, to one of the great primary industries of this State. It is certainly surprising that, apart from certain investigations carried out several years ago at the Townsville Tropical Institute by Drs. Breinl and Nicoll, and those conducted by myself and staff in the University, Brisbane, practically no research relating to this important subject has been attempted in this State. The Commonwealth Government has subsidised in a small way some work carried out in New South Wales and Northern Territory. The earlier work of Dr. Cleland and the writer (1909-1911) was performed whilst in the service of the New South Wales Government. There is urgent need for the State authorities to undertake work, seeing that Queensland is the country most concerned in the problem. Such research work should be paid for by the community, and should be carried out by special research workers, properly qualified, controlled either by the Department of Agriculture or else, preferably for the independence of the researches, at the University.

The nodules, which occur especially in the brisket and stifle joint, vary somewhat in shape and size, but are generally of rounded outline, often flattened on two sides, and measuring from less than an inch to as much as four inches in their greatest length. Near the centre of each "worm nest" there lies a long, closely coiled female worm, 20 to 56 inches in length, with which there may be associated one or more small males, 1½ to 2 inches long. The surrounding mass of fibrous tissue, which constitutes the bulk of the nodule, is really a reaction on the part of the adjacent tissues of the host against the presence of the parasite. Ultimately the latter dies, disintegrates, and undergoes calcification, but the nodule remains.

The female worm has its exterior ornamented by the presence of cuticular ridges wound spirally round the body. The degree of prominence and the closeness of these ridges to one another vary in the different parts of the body, but are fairly constant on the thickest part, the midregion of the worm. They differ, however, in the different species of *Onchocerca* and are used as a means for differentiating these parasites of

connective tissue, which are known to infest bovines, the camel, horse, and man. Sometimes the parasite shows a preference for a particular situation in its host animal, *e.g.*, one species invades the tendons of the horse's foot, while another parasitises the neck ligament, whereas in cattle one is especially common in the brisket (*O. gibsoni, O. indica*), another in the neck ligaments and certain other situations (*O. gutturosa*), another in various joints (*O. bovis*), another in the vicinity of the spleen (*O. lienalis*), and another in the aortic walls (*O. armillata*); a related worm, *Elæophora poeli*, belonging to the *Onchocercinæ*, also occurs in this situation, the last-mentioned two occurring in South-eastern Asia and adjacent islands. In all cases the *Onchocerca* parasites invade connective tissue.

The most important matter from the economic standpoint is the prevention of infection. But this presupposes a knowledge of the life history of the worm before it enters the ox. In other words, by what means is the parasite transmitted from ox to ox? How does it enter the bovine? Is it carried by some kind of blood-sucking insect, such as a mosquito, midge, louse, march fly (*Tabanid*) or other biting fly, or by a tick, *e.g.*, one of the cattle ticks (*Boophilus australis, Rhipicephalus sanguineus*); or is it transmitted by some aquatic organism? It is not likely to be transferred directly from ox to ox without the assistance of some intermediary. Though a great deal of experimental work has been carried out in New South Wales, Northern Territory, and this State, all results have as yet been negative. It can be safely stated that so far we have no knowledge as to what kind of organism acts as the necessary transmitting agent; and until that is known, one cannot hope to formulate successful measures for the protection of stock against this extremely common worm parasite. In the case of a related filarial worm (*Filaria bancrofti*) which very frequently infests human beings in Brisbane, it is known that certain mosquitoes which breed in abundance in the surrounding districts can readily act as transmitters; in fact, such insects are necessary agents, as infection would not occur without their help, since certain early stages in the life history of the parasite must be passed through within the mosquito, the early larvæ of the worm gaining access to the mosquito when the latter sucks up infected human blood, the fully developed larvæ invading the human body at a later date when the mosquito again feeds on human blood. Hence the disease human filariasis (including elephantiasis) can be controlled (1) by enforcing efficient measures for the destruction of mosquitoes, especially during the larval stage, when they may be most readily and effectively attacked and destroyed; and (2) by preventing mosquitoes from gaining access to infected patients (especially at dusk or evening), and thus becoming potential sources of infection to other people after the period necessary for the development of the worm-larvæ within the mosquito has elapsed.

These remarks should emphasise the importance of having research work carried out, having in view the discovery of the transmitting agent or agents of cattle *Onchocerciasis*, such work to be followed up, if necessary, by a study of the biology of the transmitters in order to ascertain the most advantageous time to attempt to control it, and thus indirectly control the spread of *Onchocerca gibsoni*. This parasite is not restricted to Australia; but occurs in the East Indies and South-eastern Asia also, while a closely related worm (*O. indica*) is found in cattle in India.

II. ONCHOCERCA GUTTUROSA, Neumann.

The second species, present in cattle in New South Wales and especially in Queensland, is now determined as *O. gutturosa*. A related, or perhaps identical, species infests cattle in the Argentine Republic and Uruguay (where it is called *O. bovis*), and in the United States of America. The parasite was originally described as occurring commonly in the neck ligament of cattle in Northern Africa (Algeria, Tunisia). In Australian bovines it is to be found in the ligament in the region between the first and fifth dorsal vertebrae as well as in the vicinity of the trochanter, and at times the stifle joint also. Though so common in this State (probably 50 per cent. or more of cattle killed at abattoirs being infected), its presence was not recorded until last year, when M. J. Bancroft and the writer reported it.

The lesions caused by this worm are much less obvious than those set up by *O. gibsoni*. Nodule formation is either absent or much less obvious, though a certain amount of fibrosis takes place. The female worms are much less intricately coiled, considerably thinner, and with ridges less prominent and much further apart than in the former species. Between the spiral ridges there are about four striæ, whereas in *O. gibsoni* there are only two. The distance between ridges in the midregion of the body is about one-third to two-fifths of the midbody diameter, whereas in the former species it is from one-tenth to one-eighth. The male of *O. gutturosa* is rather smaller.

Degeneration and calcification occur after the death of the worms. Owing to the sites of infection and the usually comparatively small lesions caused, this species has little economic importance.

III. ONCHOCERCA LIENALIS, Stiles.

This third species infesting Queensland cattle is to be found in the gastro-splenic ligament, close to the spleen, where the female worm appears as a long whitish thread enclosed in a delicate tunnel of connective tissue, the whole so resembling a nerve or empty blood vessel at first sight that its presence has been completely overlooked until now, this constituting the first record of its presence outside the United States, as far as the writer is aware. It is very commonly met with in Brisbane abattoirs as well as elsewhere in the State.

A specimen measured in Brisbane reached 17 inches in length, but its maximum breadth was only one-hundredth of an inch. This species possesses very low cuticular ridges, situated rather close together, their distance from each other in the midbody of a female being equal to about one-fifth of the maximum body diameter. There are two striæ between adjacent spirals.

O. lienalis appears to have no economic significance in regard to meat inspection.

It is reasonable to expect that similar agents, not necessarily specifically identical, will be found to act as transmitters of these three species of *Onchocerca*, whose common and widespread occurrence suggests that the transmitting agents must also be very common and widespread.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1921 AND 1920, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1921.	July, 1920.		July.	No. of Years' Records.	July, 1921.	July, 1920.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·88	20	1·24	1·04	Nambour	2·56	25	6·66	2·72
Cairns	1·61	39	1·64	2·32	Nanango	1·72	39	3·52	3·13
Cardwell	1·44	49	2·49	3·25	Rockhampton ...	1·37	34	5·81	0·83
Cooktown	1·00	45	1·19	1·31	Woodford	2·43	34	5·37	1·99
Herberton	0·64	34	2·40	0·88					
Ingham	1·57	29	3·64	3·81					
Innisfail	4·71	40	7·33	7·89					
Mossman	1·57	13	1·28	3·68	*Darling Downs.*				
Townsville	0·52	50	3·45	0·27					
					Dalby	1·79	51	3·30	3·36
					Emu Vale	1·44	25	5·77	3·45
Central Coast.					Jimbour	1·70	33	2·04	3·46
					Miles	1·79	36	2·25	3·67
Ayr	0·53	34	5·68	0·42	Stanthorpe ...	1·93	48	8·07	3·11
Bowen	0·91	50	2·77	1·17	Toowoomba ...	2·00	49	5·33	4·03
Charters Towers ...	0·53	39	2·85	0·37	Warwick	1·77	34	6·32	3·73
Mackay	1·59	50	7·19	0·93					
Proserpine	1·04	18	8·08	1·44					
St. Lawrence ...	1·20	50	4·45	0·80	*Maranoa.*				
South Coast.					Roma	1·41	47	6·88	3·24
Biggenden	1·25	22	2·62	1·59					
Bundaberg	1·89	38	2·88	1·87	*State Farms, &c.*				
Brisbane	2·28	70	6·14	2·19					
Childers	1·59	26	3·93	1·49	Bungeworgorai ...	1·14	7	7·05	3·03
Crohamhurst ...	2·43	26	7·85	2·60	Gatton College ...	1·31	22	4·12	2·55
Esk	1·93	34	4·24	3·76	Gindie	1·06	22	2·85	1·23
Gayndah	1·47	50	2·78	1·18	Hermitage ...	1·50	15	6·37	4·07
Gympie	2·11	51	5·40	1·97	Kairi	1·10	7	...	1·78
Glasshouse M'tains	2·08	13	6·62	2·47	Sugar Experiment Station, Mackay	1·28	24	6·97	0·82
Kilkivan	1·69	42	2·22	1·32	Warren	0·68	7	5·42	0·91
Maryborough ...	1·93	50	3·46	1·58					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1920, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND, State Meteorologist.

The Horse.

CERTIFICATES OF SOUNDNESS.

List of Stallions registered and certified as sound, in the course of the month of July :—

Name of Horse.	Owner.	Address.
	DRAUGHT HORSES.	
Donald Crystal (L) ..	L. E. Walker	Brisbane
Prince of Invermay ..	G. Elliott	Laidley South
	BLOOD HORSES.	
Roseacre (L)	Wilson and McDouall ..	Calliope, Gladstone
Hopost (L)	W. Hayes	Mount Stanley, Linville, Esk
Had-I-Wist (L)	L. E. Walker	Brisbane
	TROTTERS.	
Fred Cahill (L)	Nurse Walsh	Earl street, Normanby, Brisbane
Rexie	E. Tuke	Rocklea
Dexter	F. Noffke	Glenore Grove, Forest Hill
Little King Cole ..	S. Morris	Ottaba, *vid* Esk
Cole King	T. K. Fitzgerald	Samford
	PONIES.	
Laddie (L)	S. C. Dahlin	Doggett street, Valley, Brisbane
Young Wiltrim (L) ..	W. Mewett	Kilcoy

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR JULY, 1921.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Bellona	Ayrshire ...	26 June, 1921	1,423	3·6	56·83	
Prim	Holstein ...	9 Mar. ,,	1,251	3·6	50·00	
College Cold Iron	Jersey ...	10 Mar. ,,	889	4·6	46·01	
Wattle Blossom ...	Guernsey ...	24 May ,,	662	5·4	42·42	
Hedges Nattie ..	Holstein ...	26 Feb. ,,	992	3·6	39·84	
College Mignon ...	Jersey ...	7 July ,,	605	4·5	30·50	
Miss Betty ...	,, ...	7 ,, ,,	613	4·4	30·25	
Charming Damsel	Ayrshire ...	12 May ,,	659	3·8	27·92	
Iron Plate	Jersey ...	12 July ,,	530	4·6	27·43	
Lilia	Ayrshire ...	3 April ,,	620	3·9	26·98	
Magnet's Leda ...	Jersey ...	6 Oct., 1920	436	5·1	26·68	
College Evening Glow	,, ...	10 Nov. ,,	352	6·2	26·18	
Rosine	Ayrshire ...	19 Jan., 1921	603	3·6	24·09	
Miss Fearless ...	,, ...	21 May ,,	637	3·4	25·08	
Hedges Dutchmaid	Holstein ...	26 May ,,	660	3·3	24·06	
Leda's Jessie ...	Jersey ...	14 Jan. ,,	289	6·8	23·55	
Thornton Fairetta	,, ...	15 Mar. ,,	348	5·6	23·38	
Confidante ...	Ayrshire ...	12 May ,,	481	4·1	22·27	
Royal Mistress ...	,, ...	19 Mar. ,,	570	3·5	22·12	
Dawn of Warragaburra	Jersey ...	15 Oct., 1920	351	5·3	21·65	
Confidence... ...	Ayrshire ...	8 Feb., 1921	513	3·8	21·62	
Comedienne ...	Jersey ...	26 Nov., 1920	425	4·4	20·98	
College Cobalt ...	,, ...	6 Jan., 1921	411	4·5	20·73	
College Grandeur	,, ...	29 Dec., 1920	403	4·6	20·72	
Gatton Empire Lass	Guernsey ...	3 May, 1921	427	4·2	20·12	

NOTE.—Only cows producing 20 lb. of butter, or over, for the month are included in this list. The rainfall at the College for the month of July totalled 412 points.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1921.

In spite of the unseasonable weather conditions, the production for the month was satisfactory. There were odd cases of moulting, but very little trouble was caused by broodiness, and the health of the birds generally has been good. R. Gill's group of White Leghorns made top score for the month in the light section with 141 eggs. In the heavy breeds W. Becker's group pen of Langshans laid the largest number of eggs with 151 to their credit. The groups generally have been more settled during the month. This can, in a great measure, be attributed to the shelter caused by the continuous housing, the backs being solid for a distance of 120 feet. A plentiful supply of green feed has been available. The following are the individual records:—

Competitors.	Breed.	July.	Total.
	LIGHT BREEDS.		
R. Gill	White Leghorns	141	490
H. C. Thomas	Do.	129	476
F. Birchall	Do.	122	465
*W. and G. W. Hindes	Do.	133	460
*J. M. Manson	Do.	139	454
*G. Trapp	Do.	100	447
Oakleigh Poultry Farm	Do.	132	445
*Mrs. R. Hodge	Do.	127	429
*C. M. Pickering	Do.	121	427
*H. Fraser	Do.	116	425
R. C. Cole	Do.	127	422
*J. W. Newton	Do.	122	418
*H. C. Towers	Do.	113	416
W. A. Wilson	Do.	107	401
*T. Fanning	Do.	119	380
*W. Becker	Do.	112	374
*Chris. Goos	Do.	117	372
*E. Chester	Do.	121	372
Bathurst Poultry Farm	Do.	111	369
W. Barron	Do.	113	366
*R. C. J. Turner	Do.	110	363
H. Stacey	Do.	131	360
O. C. Goos	Do.	81	359
Mrs. E. White	Do.	106	359
M. F. Newberry	Do.	113	355

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
LIGHT BREEDS—*continued.*			
E. Stephenson	White Leghorns... ...	112	355
Mrs. E. Z. Cutcliffe	Do.	120	351
*Thos. Taylor	Do.	117	350
J. W. Short	Do.	94	347
*Thos. Eyre	Do.	123	345
*B. Chester	Do.	121	334
*Mrs. L. Anderson	Do.	111	334
*S. L. Grenier	Do.	104	329
*S. Williams	Do.	109	325
*Haden Poultry Farm	Do.	100	322
*W. and G. W. Hindes	Brown Leghorns... ...	103	312
*E. A. Smith	White Leghorns ...	86	311
Linquenda Poultry Farm	Do.	108	303
W. M. Glover	Do.	110	288
*H. P. Clarke	Do.	115	277
Brampton Poultry Farm	Do.	95	257
HEAVY BREEDS.			
Jas. Potter	Black Orpingtons ...	117	523
T. Fanning	Do.	132	509
*J. Ferguson	Chinese Langshans ...	134	465
*T. Hindley	Black Orpingtons ...	124	459
Rev. A. McAllister	Do.	133	454
*A. E. Walters	Do.	131	442
Jas. Every	Langshans	120	440
Jas. Ryan	Rhode Island Reds ...	139	436
G. Muir	Black Orpingtons ..	127	426
*R. Burns	Do.	147	424
*C. C. Dennis	Do.	141	412
*Parisian Poultry Farm	Do.	146	409
W. Becker	Langshans	151	403
*E. F. Dennis	Black Orpingtons ...	134	395
*R. Holmes	Do.	129	393
*E. Stephenson	Do.	107	375
*E. Morris	Do.	135	372
*J. Cornwell	Do.	129	368
G. Cumming	Do.	122	348
*H. Chaille	Do.	105	335
*Mrs. G. Kettle	Do.	110	310
J. W. Newton	Do.	114	297
*N. A. Singer	Do.	132	293
*A. Shanks	Do.	120	292
*J. E. Smith	Do.	140	284
*E. Oakes	Do.	102	235
F. H. Harrington	Do.	121	211
T. C. Hart	Do.	93	185
Total	...	8,226	25,839

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors	A.	B.	C	D.	E.	F.	Total.
LIGHT BREEDS.							
W. and G. W. Hindes	88	64	78	90	86	54	460
J. M. Manson	68	83	83	68	85	67	454
Geo. Trapp	73	68	72	73	79	82	447
Mrs. R. Hodge	66	84	81	73	83	42	429
C. M. Pickering	81	74	64	62	85	61	427
H. Fraser	80	65	75	61	76	68	425
J. W. Newton	72	81	78	59	72	56	418
H. C. Towers	77	59	72	50	72	86	416
T. Fanning	73	59	64	61	55	68	380
W. Becker	71	79	52	57	92	23	374
Chris. Goos	67	83	28	40	52	102	372
E. Chester	63	68	61	61	58	61	372
R. C. J. Turner	67	57	54	48	67	70	363
Thos. Taylor	52	69	58	39	50	82	350
Thos. Eyre	52	54	46	59	69	65	345
B. Chester	49	49	74	50	70	42	354
Mrs. L. Anderson	47	65	60	59	63	40	334
S. L. Grenier	57	77	32	59	56	48	329
G. Williams	91	61	32	43	48	50	325
Haden Poultry Farm	52	44	50	56	52	68	322
W. and G. W. Hindes	42	38	33	74	50	75	312
E. A. Smith	80	53	53	48	45	32	311
H. P. Clarke	79	36	46	26	42	48	277
HEAVY BREEDS.							
J. Ferguson	83	67	66	86	80	83	465
T. Hindley	95	72	77	66	79	70	459
A. E. Walters	76	82	68	78	61	77	442
R. Burns	34	57	99	50	91	93	424
C. C. Dennis	80	67	50	76	69	70	412
Parisian Poultry Farm	66	66	66	95	38	78	409
E. F. Dennis	46	75	62	64	63	85	395
R. Holmes	56	57	62	74	91	53	393
E. Stephenson	72	59	65	59	51	69	375
E. Morris	57	73	32	83	62	65	372
J. Cornwell	61	38	66	75	65	63	368
H. Chaille	38	68	54	81	66	28	335
Mrs. G. Kettle	49	68	77	25	33	58	310
N. A. Singer	47	37	49	52	38	70	293
A. Shanks	22	51	39	57	62	61	292
J. E. Smith	78	76	51	38	25	16	284
E. Oakes	8	59	42	65	37	24	235

CUTHBERT POTTS,
Principal.

The Orchard.

NOTES ON THE MANURING OF PINEAPPLES.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

In spite of the advice that has been given by the Agricultural Department for many years respecting the manuring of pineapples, many growers still fail to realise that the pineapple plant requires special manurial treatment which will provide an ample supply of the essential plant foods in a form that will enable it to utilise them to the best advantage.

Experience has taught us that the success of pineapple culture does not depend so much on the richness of the soil as on its being in a good mechanical condition and possessing good natural drainage. Such a soil is naturally warm, and if the situation is suitable is not likely to be subject to frost. The good mechanical condition of the soil encourages root formation, and if the soil has been well prepared, deep rooting; so that the feeding roots of the plant have a much larger area from which to obtain their supply of food than is the case when the majority of their feeding roots are near the surface.

Such a soil responds readily to the application of manure; consequently it is of the greatest importance to make sure that the manures applied to develop the pineapple crop are applied in the right form and that they contain their plant foods in the proper proportions required by the plant. Manuring carried out on any other lines is simply a waste of money, as it is no use to apply a manure containing an excess of one plant food and a deficiency of others. A manure containing an excess of any particular plant food is not an economical one to use, especially where there is an excess of phosphoric acid, as the excess of this plant food cannot be made use of, and as a result it is either washed out of the soil by heavy rain or, unless there is an excess of lime present, it forms insoluble salts of iron and alumina which remain in the soil in an unavailable condition.

The great fault with the majority of commercial fertilisers with respect to their suitability as a manure for pineapples is that they contain a large excess of phosphoric acid that is not required by the plant and which is out of all proportion to the amount of its potash and nitrogen contents. As a result, such manures are bad buying on the part of growers as, on account of their badly balanced composition, they cannot be made use of by the pineapple plant to the best advantage, and the grower has thus paid for a quantity of plant food from which he will obtain no benefit.

Many commercial fertilisers, in addition to having a badly balanced ratio of plant foods as regards pineapples, also contain these plant foods in the wrong form.

The pineapple plant is very sensitive to any excess of acidity in the soil, and any such soils must have their acidity neutralised by the application of lime before they are fit to grow pineapples; consequently the addition of acid phosphates, such as are contained in a commercial fertiliser in the form of superphosphate, only tend to increase the acidity in the soil and render it less suitable for pineapple culture.

Commercial fertilisers containing superphosphate should therefore always be avoided as a manure for pineapples, and growers should be careful not to purchase any fertiliser in which the phosphoric acid is said to be water soluble on the tag attached to the bag or on the invoice. Phosphoric acid should be in the citrate soluble form, such as occurs in bones, meatworks manure, finely ground island phosphates rich in carbonate of lime, basic slag, or basic superphosphate, or it can be present in a less soluble form which will become slowly available. Growers should therefore see that the phosphoric acid as stated on the tag or invoice is citrate soluble or insoluble, the larger proportion being citrate soluble.

The potash contained in the fertiliser should be in the form of sulphate, if procurable, as experience has shown that in this form its use has proved very beneficial; at the same time, the use of the muriate or chloride has so far shown no ill-effects.

The nitrogen contained in dried blood, bone dust, or meatworks manure has given very good results, and when procurable dried blood is probably the best form in which to apply this plant food. The price is, however, very high, and sulphate of ammonia has, therefore, taken its place in the majority of complete commercial

Photo. Dept. Agriculture and Stock.]

PLATE 31.—PINEAPPLE MANURING AT BEERBURRUM SOLDIER SETTLEMENT.

1. Effects of badly balanced manure.
2. Effects of well balanced manure.

fertilisers, and, when used in the right proportion, has given good results. Nitrate of soda is also a good form in which to apply nitrogen, but from my experience it is better to apply this manure as a top dressing by itself rather than to use it as a component part of a complete fertiliser. The growing of a green crop for the purpose of providing a supply of nitrogen must be watched very carefully, as there is always the danger of rendering the soil acid by turning in large quantities of green material which generates acidity during the process of decomposition. Should this take place, the addition of lime to the soil will soon correct the acidity.

Many manurial experiments were carried out by the Department some years ago on pineapples growing on different classes of soils in the Brisbane District, and the result of those experiments is contained in the advice I have just given and the correctness of which has again been proved by a number of manurial experiments that have been carried out at Beerburrum, both on the State farm and on soldiers' holdings, where it has been shown conclusively that the majority of commercial fertilisers contain far too great a proportion of phosphoric acid in comparison with their potash and nitrogen contents, and, further, that the application of phosphoric acid in the form of superphosphates or water soluble phosphoric acid is distinctly injurious to the pineapple plant and is the cause of "spiking," viz., the production of narrow leaves indicating the weakened vitality of the plant.

A complete manure in use at Beerburrum, which has given very good results, contains approximately 4 per cent. of phosphoric acid, citrate soluble, 14 per cent. of potash in the form of sulphate, and 7½ per cent. of nitrogen in the form of dried blood, and this mixture is applied at the rate of 750 lb. to the acre during the months of August, September, and February. If these figures are compared with those of any complete commercial fertiliser on the market, it will be seen how small an amount of phosphoric acid is used as compared with that contained in the commercial article, and what a large amount of nitrogen and potash is present. This shows conclusively that growers are wasting money by applying an excess of phosphoric acid to their pineapple crops, and that the money so spent would have been much more profitably invested in the purchase of the nitrogen and potash that their crops needed.

The results obtained at Beerburrum bear out, as already mentioned, those obtained by this Department some years ago; and, further, they are in accord with the requirements of the pineapple plant and fruit as shown by chemcial analyses. A careful perusal of these analyses discloses the fact that the pineapple plant and fruit require twice as much nitrogen and more than twice as much potash as they do of phosphoric acid.

Growers will therefore see that it will pay them to apply the right manure to their pineapple crop, and that they only waste money by purchasing manures containing an excess of a plant food which this crop is unable to make use of.

HAND-REARING OF CALVES.

Hand rearing is adopted by most dairymen in order to procure the best monetary returns, but frequently the calf is the sufferer. A young animal requires natural food for the first few months; consequently, it cannot be expected to thrive and and keep in good health when it is fed on separated milk, practically devoid of fat, and frequently more or less contaminated with dirt and its accompanying organisms.

It is most important, for the first two or three days after birth, to give the calf its mother's milk (colostrum). This acts as a natural laxative, which is essential to clear the bowels of fœtal deposits (meconium). Following the first few days the calf should be given about 2 pints of new milk three or four times daily for at least four weeks, after which skim or separated milk can be given which is mixed with other foods, such as oatmeal or linseed gruel, the latter making up for the abstracted fat. Usually, when the calf is six weeks old it begins to pick grass or a little hay, but the skim milk and linseed should be continued until the calf is three or four months old, and always given at about the normal blood heat.

LINSEED JELLY.

Boil slowly for three or four hours, 1 lb. of linseed in 3 quarts of water, so that about 2 quarts of jelly or thick fluid remains. Mix about 4 oz. with the separated milk at each meal. Increase quantity as required.

OATMEAL GRUEL.

Mix 1 lb. of oatmeal in a gallon of cold water, and then boil; keep well stirred, then allow to simmer over a slow fire until it becomes thick. Allow 4 to 6 oz. with separated milk at each meal.

Horticulture.

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

SPATHODEA CAMPANULATA.

(Tropical West African Tulip Tree.)

NATURAL ORDER BIGNONIACEÆ.

BY E. W. BICK, Curator, Brisbane Botanic Gardens.

Derivation.—(From "Botanical Magazine," T. 5091, and "Flora Tropical Africa," vol. 4, page 529.) This very beautiful flowering tree was first found and described by M. de Beauvois, a noted French botanist, who collected specimens at Oware, West Africa. It is common in many localities of Upper, South, Central, and Lower Guinea, such as Sierra Leone, Nigeria, Cameroons, French Congo, Lower Congo, Congo Free State, and many others.

Description.—A tree 20 to 50 ft. high, of erect habit, with freely branching top. Leaves opposite, from 12 to 18 in. long, swollen at base, pinnate, dark green, paler and somewhat silky beneath, particularly in young state, leaflets from 4 to 8 pairs, and single terminal one, ovate lanceolate, acute, quite entire, and penninerved.

Flowers, in short dense terminal racemes, corymbose, large, spreading, consisting of from 8 to 10 rather long and stout-pedicelled, very large showy flowers. Calyx like a spathe, 2½ in. long, splitting open on one side for the emission of the corolla. The corolla is about 4 in. long and the same in breadth, of a rich orange red colour, slightly paler within the tube; in form, broadly campanulate (bell shaped), yet curved upwards, the tube being suddenly contracted at the very base, where it is attached to the calyx. This gives the individual flowers a somewhat lop-sided appearance, sharply contrasting with the even form of the tulip, from which it takes its vernacular name. The tube is from 2 to 2½ in. in depth, stamens four included within the tube, spreading, one pair being a little taller than the other two. Anthers of two divergent, linear, oblong, dark brown linear cells opening longitudinally, ovary ovate.

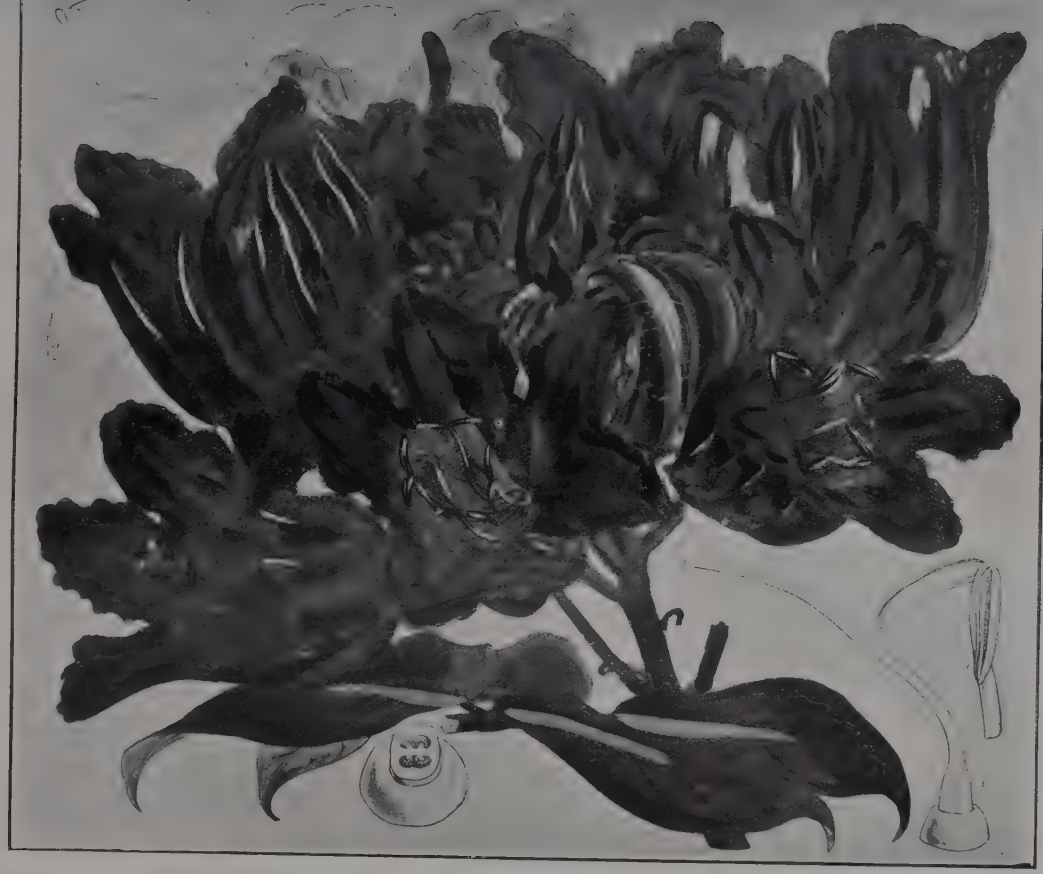
Seed Capsule lanceolate oblong, from 6 to 10 in. long; valves keeled, seeds flat, about 1 in. in length and ½ in. broad. This includes the white hyaline wing that surrounds the dark brown seed, in appearance resembling very much that of *Jacaranda mimosæfolia*, the well-known Brazilian tree of the same natural order. A capsule that ripened in the Botanic Gardens contained a little over 1,000 seeds, but only about one-quarter were fertile.

Spathodea campanulata flowers from April until June, but spasmodic racemes of flowers are often borne out of the usual flowering season. A good specimen, near the George street entrance of the Gardens, when in flower always attracts the attention of visitors. There are three other flowering specimens in the Gardens, and a line of these beautiful trees, alternating with *Poinciana regia*, was planted last year along the river bank from the Domain to end of old line of bunya trees.

Propagation.—By seed. As the trees in the Botanic Gardens are now commencing to seed, this fine tree will soon be more often seen, and its brilliant orange-red flowers will enliven the landscape at rather a dull time of year. It would make an excellent street tree, but for the large flowers falling on hard pavements being likely to prove slippery and dangerous to pedestrians; still, as they are such striking and attractive flowers, passers-by would probably pick them up.

HORTICULTURAL NOTES.

This is a very good time to plant out palms, the cold weather being over, and they will have a chance of getting a hold of the ground before the heat of summer is in evidence. When planting, don't disturb the roots unduly; they are very averse to such treatment. Should the roots be in a dense mat, remember palms send out new roots from the stem that take up the running when the earlier root system of the plants has completed its work. Kinds to plant in warm localities.—*Phœnix rupicola* is a very beautiful palm for lawn specimens, as it does not grow too tall;



From coloured plate, "Botanical Magazine."]

PLATE 32.—TULIP TREE (*Spathodea campanulata*).

Oreodoxa regia (Royal Palm), and *Cocos plumosa* (Feather Palm). Of the latter a good type should be planted. Those of not too tall a nature should be used, and *Livistona chinensis* (Chinese Fan Palm) is also very ornamental. For cool districts the "Cotton" Palm (*Washingtonia filifera*) is very suitable, as it stands a fair amount of cold; also Cocos Yatay, the Brazilian Wine Palm.

Pot plants and bush-houses should now receive attention. Look over the former, and re-pot all needing attention, particularly ferns and palms. Don't overpot. Soil in pots not used or penetrated by roots is very apt to go sour. Wash clean all old pots, and soak new ones in water before using. Use a free compost of about equal parts of leaf mould, good loam, sharp sand, and old well-decayed cow manure. A little charcoal mixed through the compost is advantageous, particularly for ferns, gloxinias, and caladiums. For the two latter, both the manure and sand portions of the compost should be increased. When repotting, provide for good drainage; this is most important, and keep the plants well supplied with water afterwards.

In the flower garden, keep young aster plants growing freely. Remember that if they once get a severe check in growth, large plants and first-class flowers cannot be looked for. Plant our chrysanthemums. Old clumps are best brokn up. Select a nice strong portion, plant in a fresh place if possible, and throw out the remainder if not required. If not replanted, chrysanthemums degenerate quickly, and only sunflowers, and portulaca seeds. This latter is a useful, bright flowering plant, and may be grown during the summer on newly-planted rose beds to act as a protection of the surface from the hot sun of summer. Keep all newly-planted things watered, and stir the surface soil occasionally.

AN EASY WAY OF STARTING OIL ENGINES.

To every user of engines driven by crude oil the process of starting is a nightmare. The blow lamp, by means of which the fuel spray is usually given its initial heat, is a device with an almost satanic cussedness of behaviour. Moreover, its use involves a considerable amount of time as well as trouble. Consequently, there ought to be a wide welcome for an ingenious electric heater developed by a leading British firm of oil-engine makers. The device is extremely simple. It consists essentially of an electric heating element of high resistance wire placed in the line of action of the oil spray. A small amount of current suffices to make this wire white hot, in which condition it brings the spray rapidly to the temperature required for starting. After the engine has gone ahead the element is withdrawn, so that it is not exposed for more than a minute or so to the high temperature of the combustion chamber, an arrangement which gives it long life and great reliability. The electric current required for operating the heater is supplied by a 4-volt or a 6-volt battery charged from a tiny electric generator, driven through a bolt from the engine. By means of this device the engine can be quickly started up from the cold without the slightest trouble. Twelve months' trial of the apparatus has shown it to be thoroughly satisfactory.

HAND-REARING OF FOALS.

There is a great deal of trouble in hand rearing a foal. As is well known, the first milk any animal gives after parturition is known as "colostrum," which is a natural purgative. Consequently, it is necessary, if a foal is hand fed from the time of its birth, something must be given as a substitute for this colostrum. The best milk for this purpose is that from a newly calved cow or heifer—a few days after calving. The milk of the one animal only should be used.

If the foal has not had the colostrum from its mother and appears constipated, give a small dose of castor oil—about two tablespoonfuls—and enemas of glycerine and water.

The chief difference between a mare's milk and cows' milk is that the latter has a larger proportion of casein and fat, and a deficiency of sugar; therefore, one must add sugar when cow's milk is used. At first give 1 part of water to 2 parts milk (half a pint every half-hour). A few weeks later give 1 part of water to 3 parts milk. When about two or three months old, give pure milk. Gradually increase the time between the meals as the foal gets older.

Milk should be given at the natural temperature, great cleanliness being observed in handling and diluting the milk.

Tropical Industries.

SUGAR: FIELD REPORTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 5th August, 1921) from the Southern Field Assistant, Mr. J. C. Murray:—

"In the course of the month the districts of Maryborough, Pialba, Yerra, Mount Bauple, and Nambour have been visited. An inspection was also made of districts between Gympie and Nambour.

"*Maryborough.*—The Maryborough district is at present in a promising condition in respect to sugar-cane culture. The areas planted are not extensive, but the cane is well grown, and at present the sugar content is fairly high. Farming operations are being impeded by the water that is on the ground. Preparations for spring planting are being pushed on, several farmers being engaged in the clearing and tillage of hitherto uncultivated soils.

"Not sufficient trouble is being caused by cane pests and noxious weed growth for comment, although gumming is evident in places. An inspection of the various canes showed that D.1135, 1900 seedling, and M.87 are probably doing better than any. There are no new features to comment upon.

"The soil needs lime and green manures. More care requires to be taken in selection of plants, and farmers should make the question of cultivating their young plant cane a more serious one, and not use heavy implements in the early processes.

"There are at present some good crops in the Pialba District. The heavy rain has given the soil a thorough soaking, and this, combined with economical bursts of warm sunshine, has caused the cane to make strong growth. Some of the plant standover cane ought to go 40 tons per acre, and the great bulk of the crop should average between 20 and 30 at the time of cutting. This does not include, however, cane practically killed by the drought. There is a small acreage in the latter condition that ought to be ploughed out as soon as the useful cane has been cut from it. So far, the growers have escaped frosts, but there is a likelihood that these may occur at any time, as the nights are fairly cold. Nothing serious in respect to insect or bacterial attack could be detected in the fields, and if farmers watch their planting operations carefully, the coming season should produce a fine crop of healthy cane. As previously mentioned, these lands want lime and green manures. Regarding varieties, D.1135 and 1900 Seedling are both making a fair showing. The former is the staple variety at Pialba. Such canes, however, as Q.813, E.K.1, E.K.28, and 100 Bont, all recently distributed from the Experiment Station, are making good growth, and are well worth looking after. Shahjahanpar No. 10 is also a cane lately brought from Bundaberg, and has struck fairly vigorously. It has a reputation as a frost resister and is worth watching. Satisfactory conditions prevail at Yerra. Most of the cane is vogorous, showing little signs of disease. Clearing of virgin land is in progress. Bad roads are still the greatest drawback. Farmers here, as well as in other districts, should remember that in the early months of the cane's growth it is absolutely essential to check weed growth and keep a good tilth on the soil. By careful observation of these principles they will increase their output very considerably. Weeds are greedy feeders, and rob the cane of much in this respect..

"*Mount Bauple.*—The growers at Mount Bauple are going to have a fairly good yield this crushing. In common with other areas, the good rains have pushed the crops ahead and given the ground a thorough soaking. Some of the plant standover crop looks especially well. Insect pests are well under control, with the exception of a borer attack in isolated patches.

"Some remarkably good crops are being produced at Bauple on the forest loams. These soils (*i.e.*, forest loams) have no great powers to sustain crop after crop, but they are prolific for a few years and then require green manure. The growers in this district, as a general rule, recognise the value of good tillage, and many are working and carrying on efficient ploughing and cultivating under very adverse conditions, particularly where the country is hilly.

"On the road between Gundiah and Bauple there is a considerable amount of cane growing in a healthy condition, and one farmer, Mr. Woods, in common with several others in this locality, will have some very good cane to cut.

"*Cooroy.*—An inspection was made of the land around Cooroy. Some farmers there have planted cane (variety D.1135 and H.Q.285) which looks well. These men ought to persevere, as conditions are suitable and they now have enough cane for plants. Cooroy is not ideal for canegrowing, but much of the land would grow this crop.

"*Yandina.*—While at Yandina a visit was made to Mr. Bowder's property. This gentleman has done some excellent development work in this locality, and has been repaid by a good crop. On a previous visit to this farm, nothing like the present crop was anticipated, and in some places it will go 35 and 40 tons per acre. The three varieties planted, D.1135, H.Q.285, and Q.813, all look well. A siding has been constructed at the instance of Mr. Bowder near the holding.

"*Nambour.*—Nambour district looks well at the present time. An inspection was made while here of the Maroochy River and Coolum areas. At the latter place several energetic men are busy draining big areas that are virtually swamp, but nevertheless very rich land. If the water is successfully taken off—and there is no reason why it should not be—then some big crops of cane should result. That cane will grow on the drier lands has been demonstrated also. Mr. White, a farmer in this locality, has a very fine plant crop of D.1135. There are also several other growers who have good plant crops to their credit.

"As yet, at least as far as the swamp is concerned, the matter hinges on the success of the farm engineering problems. Bigger and straighter drains than are at present in existence are necessary, thus reducing friction and increasing velocity, and the diverting of water that comes from other sources on to these areas is also essential. Coolum is a delightful place, admirably suited for banana and citrus fruit growing, and closer settlement generally.

"*Maroochy.*—The Maroochy River is going to yield some extra heavy crops of cane this year. Varieties such as N.G.16, H.Q.285, D.1135, and Malabar are all cropping heavily, especially the latter. One crop of this cane on Mr. Fahey's place will go close to 100 tons per acre. The average yield on the river this year ought to be from 35 to 40 tons per acre. A feature noted during the inspection was the absence of disease, although in places, on N.G.16, a fungoid parasite, indicated by a red rusty spot, is attacking the leaf. If this spreads, growers would do well to give this variety a rest. They can do so without hardship, as there are several other good growing canes to choose from.

"One or two old patches of cane here should be ploughed out. There is also an inclination to ratoon too often. Green manures as well as lime would increase the yield on some of the poorer soils. Practically all the farms inspected on these areas would benefit by the use of lime. Abnormal rains have fallen on the Maroochy River this year."

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 5th August, 1921) from Mr. E. H. Osborn, Northern Field Assistant:—

"*Bowen.*—A visit of inspection was paid to the Bowen area in the middle of July, and it was noticed that, considering the dry weather that had so lately been experienced, the crops were looking very well. The irrigated blocks, despite the dry weather, were looking fair, but where watering had been carried out some splendid cane may be seen.

"The rainfall to the end of June was 24.69 inches, and early in the following month a further 2.71 inches were registered. Before the latter fall the cane had started to go off considerably, but this welcome downpour freshened everything up. The principal varieties grown are the Gorus, N.G.24, 24B, Badila, D.1135, and H.Q.426 (Clark's Seedling). The two former canes are doing remarkably well, especially where irrigated, and some very heavy tonnages per acre will be harvested. D.1135 also looks well, but H.Q.426 did not appear to be doing so well where noticed. Not very much Badila was seen. As evidence of the remarkable fertility of the land at Mr. J. Maltby's farm, the following crops were growing:—Cane (looking splendid), maize, Indian corn, sorghum, buckwheat, oats, tares, lucerne, English and sweet potatoes, pumpkins, onions, eschalots, turnips, mangels, parsnips, horse radish, cabbage, cucumbers, beans, peas, rhubarb, egg fruit, strawberries, citrus fruits, and tomatoes. This shows what can be done by an up-to-date farmer aided by irrigation.

"The soil generally is stiff or sandy deep black and brown loam, and can certainly grow good crops of high density cane. Most of the farmers seen expressed

their intention of increasing their present cane areas, as they find that the Proserpine Mill is ready to take any cane that they can supply. Green manuring or liming has not so far been extensively gone in for, but is, I think, likely to become more popular, as a number of farmers expressed their views to that effect.

"*Proserpine.*—Proserpine was next visited. At this sugar centre the conditions were found to be quite the opposite to those ruling at Bowen, as up to the time of writing 81.88 inches of rain represented the rainfall from 1st January. This large rainfall has had the effect of seriously retarding all ploughing and planting operations.

"A very large acreage of ground had been ploughed several times, but planting, except in a few favoured parts, had not been possible. This was most noticeable on the Albert and Kelsey Creek land, planting there being in full swing whilst other less fortunate areas were idle.

"Now that the mill management has provided an extra length of portable line for the growers at this end, a larger area of the rich deep soil here is being planted for next season. There is still, however, a further area of really good land that ought to be growing cane. The general appearance of the crops in the vicinity of Albert and Kelsey Creeks is most promising. Some fine crops of 24B, H.Q.426, Badila, Q.813, 1900 Seedling, and D.1135 were noticed.

"Taking the Proserpine District as a whole, however, it is unlikely that the earlier estimates of tonnage to be crushed will be realised, as the constant wet and very little warmth has not been conducive to a good growth.

"The cane was also considerably knocked about by wind a couple of weeks ago, H.Q.426 suffering most severely from this cause.

"Among the varieties of cane grown locally, H.Q.426, Malagache, Green and Red Goru (24B and 24), Badila, Striped Singapore, D.1135, 1900 Seedling, and Q.813 were noticed. The latter cane has evidently come to stay, and seems to suit the district well. All the farmers here taken a keen interest in any new varieties, and their association is getting a large number of plants from the Mackay Experiment Station next month. The varieties asked for include Q.970 and Q.1121, among others. On various parts of the area some fine crops of 24B were noticed growing; 1900 Seedling was also looking well.

"This district has so far been fairly immune from pests, only light traces of grubs being noticed throughout the cane areas. In connection with grubs, it will be remembered that Mr. R. Redhead, of Strathdickie, suffered severely from them. He then planted corn, but this was also attacked by the pest.

"Subsequently, last year he again planted with cane (H.Q.426), using 80 lb. of 90 per cent. arsenic to the acre in the drills with the plants. This cane is now a fairly mature crop, looking beautifully green and healthy, without any sign of grubs.

"Borers were noticed in several parts of the district, H.Q.426 seeming to attract them more than any other variety. Too much care cannot be taken in using healthy plants in connection with this pest.

"Very little liming or green manuring has been carried out in this locality; the cost of the former has, to some extent, been the reason. With more liming and draining, better crops should certainly be grown.

"When the large area of idle land adjacent to the mill's tramlines is noticed, it raises the hope that the drainage scheme now spoken of will very soon be put into effect. This would enable some hundreds of acres of good quality land to be put under cultivation.

"The mill started crushing operations on the 28th ultimo."

SHAHJAHANPUR, No. 10.

A few years ago a variety of sugar-cane called Shahjahanpur, No. 10, was received by the Bureau of Sugar Experiment Stations from the Shahjahanpur Sugar Experiment Station, India, being recommended as a cane which would stand cold weather well. This cane was planted out at the Bundaberg station, where it was found to resist severe frosts remarkably well. Its sugar content and cropping qualities being good, it was ultimately distributed to a considerable extent in Southern Queensland. On a recent visit to Bundaberg, Mr. Easterby stated that his attention had been directed to a very fine block of this variety, about 12 acres in extent, which had been grown at Spring Hill by the Fairymead Sugar Company, under the charge of Mr. Axam. This cane was then only nine months old, but presented a splendid vigorous growth. Mr. Axam said that in his experience with the cane it had never been affected by frost, and this was borne out by Mr. Pringle, the chemist in charge of the Bundaberg Sugar Experiment Station. If this cane maintains its reputation, it should be extremely valuable to canegrowers who suffer

from frost. The last analysis of the cane made at the Bundaberg Station last year gave the following results:—

Brix	21.7	per cent.
Purity of juice	91.0	per cent.
Fibre in cane	13.6	per cent.
Commercial cane sugar	15.05	per cent.

The Fairymead Sugar Company have been of great assistance to the work of the Sugar Bureau in demonstrating this variety, and also Q.813, on large blocks of land.

BANANA POCKET AND THOMSON CREEK LANDS, NEAR PROSERPINE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 5th August, 1921) from the Northern Field Assistant, Mr. E. H. Osborn, on the above lands and their suitability for cane-growing:—

"In accordance with your instructions, I beg to report that in company with Mr. E. G. Lascelles, I inspected the following areas:—Banana Pocket is situated 14 miles south from Proserpine, and about 5½ miles east from the proposed Thomson's Creek railway siding, on the Mackay extension of the Government line, and over fairly level country.

"The 'Pocket' lies between Thomson Creek and the O'Connell River (both tidal waters), which empty themselves into Repulse Bay. There are some 2,000 acres of freehold land there, of which about 1,500 acres, consisting of, say, 750 acres of scrub and 750 acres of forest, are very good. Adjoining this area is a Crown lands reserve of 555 acres, of which about 400 acres should be suitable for growing cane.

"There is also an additional area of fully 500 or 600 acres of Crown lands, but situated upon the northern side of the O'Connell River.

"In and about the Pocket the soil consists of a rich deep black porous alluvial loam, from 2 feet in depth and upwards, with an underneath soil of some 10 to 14 feet in depth of porous river silt. Underneath this again is water-worn small boulders or sand. In the scrub the soil is similar but lighter in colour. The forest country carries such timber as acacia, apple, Moreton Bay ash, and gums. The scrub, which is fairly thick, carries the usual scrub timbers and lawyer cane.

"On the freehold area twenty-nine farms have been cut up, each of them having about an equal amount of scrub and forest land. About nine families are now occupying farms, growing bananas, corn, sweet and English potatoes, and tobacco. Nearly all of them have small plots of cane, grown principally for pig feed, but also to show that cane can be grown here successfully. I am told that plenty of well water can be obtained at a depth of about 18 feet. The nearest rainfall figures that can be obtained are those from the Goorganga Homestead. The average rainfall from 1914 to 1920—not including 1916, of which the record has been lost—was 58 inches per annum. So far the fall for this year is 58 inches as against 81.68 inches to date at Proserpine.

"Flood waters get away very quickly and do very little damage, and owing to the porous nature of the soil very little water is left lying about. Frosts also are very slight; bananas continually growing on one block for five or six years bear this out.

"Upon the farms visited some splendid cane was noticed growing. It was all planted in October and November of last year, and included such varieties as H.Q.426 (Clarke's Seedling), Goru 24A and 24B, Striped Singapore, D.1135, Malagache, Badila, and 1900 Seedling. Taking into consideration the time of planting, all the cane looked well, the 24B, Badila, and 1900 Seedling particularly so. Some of the 1900 is very fine and growing true to type. In one place a stool of thirteen or fourteen months' old Badila gave from two plants over thirty thick and vigorous canes, with an average length of about 6 feet.

"None of the cane has had much attention paid to its cultivation, and one cannot but fail to be struck with its extremely healthy appearance and splendid growth. Upon another farm some stools of green Goru (24B) said to be fourth or fifth ratoons are now carrying sticks of 5 or 6 feet in length. I am told that this particular lot has practically grown wild, being eaten down several times by cattle and other animals, but still persists in growing, and gives a fair idea of the value of the soil.

"The farmers now settled here are living in the hope that the splendid cane-growing possibilities of this rich area will be recognised in the near future, as they are certain that if the country is once opened up by either tramway or railway communication, there would be no shortage of cane for the Proserpine Mill."

Photo. by W. Perroux.]

PLATE 33.—BANANA POCKET—BANANA FARM.

PLATE 34.—BANANA POCKET.—CROP OF MAIZE.

Photo by W. Pervour.]

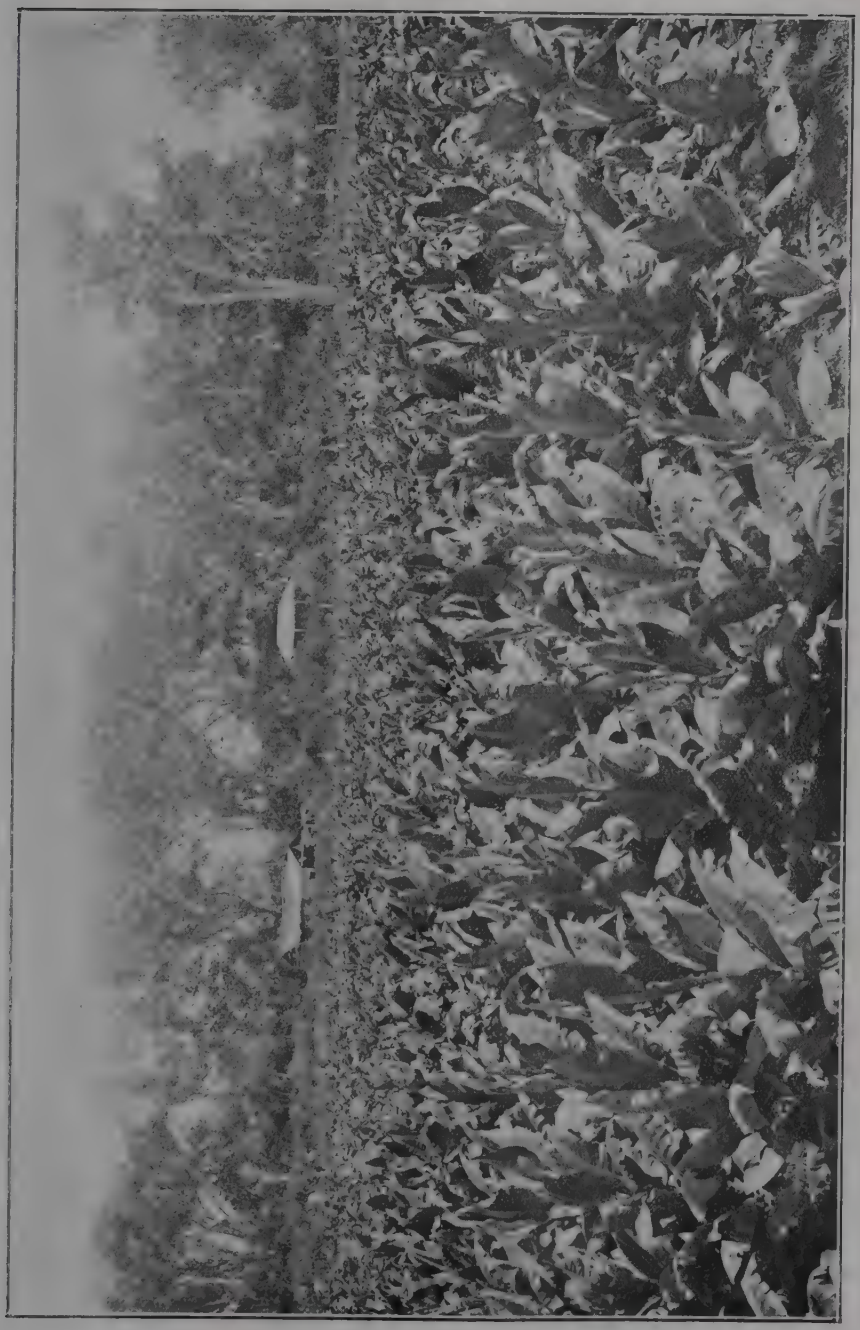


Photo. by W. Perrour.]

Plate 35.—Banana Pocket—Crop of Tobacco.

PLATE 36.—BANANA POCKET,—CROP OF TOBACCO.

Photo. by W. Perroux.]

Photo. by W. Perroux.]

PLATE 37.—BANANA POCKET—TOBACCO-DRYING SHED.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 23.

SNAKE WEED (*Stachytarpheta dichotoma*).

Description.—An erect branching herb, 2 to 3 feet high. Stem and leaves smooth, not hairy. Leaves elliptical or somewhat obovate, gradually tapering at the base into a distinct leaf-stalk, 1 to 3 inches long, ½ to 1 inch broad, the margins toothed. Flowers in long terminal slender spikes of up to 15 inches in length. Individual flowers bright blue, about ½ inch across, the lower part more or less sunk in a depression in the rhachis of the spike. Fruit ("seeds") enclosed in the calyx, consisting of two dark-brown narrow nutlets, 2 to 2½ inches long.

Distribution.—A native of tropical America now widely distributed as a naturalised alien in most tropical and subtropical countries. In Queensland it occurs practically along the whole of the coastal belt.

Common Names.—It is very abundant about Cooktown, and Mr. Pollock informs me that it is known there as "Snake Weed" in allusion to the long narrow spikes of flowers. J. C. Loudon in his "Encyclopædia of Plants" gives "Bastard Vervain" as a common English name.

Botanical Name.—Stachytarpheta, from the Greek *stachys,* an ear of corn, and *tarphetos,* thick, alluding to the flowers being closely packed in a long slender spike; *dichotoma* from the Greek *dichotomeo,* I cut in two, in allusion to the branches coming off in opposite pairs.

Properties.—No uses seem recorded for the plant. It is not known to be poisonous in any way, but seems to be left quite untouched by stock.

Eradication.—In small areas hand pulling or hoe cutting is the most effective method. In larger areas, where the plants are growing thickly together, spraying with a weed-killing solution should be successful.

Botanical Reference.—Stachytarpheta dichotoma, Vahl. Encyl. 1. p. 207 No. 5.

TWO PLANTS POISONOUS TO STOCK.

By C. T. WHITE, F.L.S., Government Botanist.

Writing from Malanda, North Queensland, Mr. H. Jubt writes, under date 18th July, 1921, "Please let me know the name of the bush of which I enclose a leaf of two. I might state that I tied two valuable heifer calves to this bush and after they had nibbled the leaves, one died and the other went blind; it seemed to paralyse their hind quarters."

The bush of which Mr. Jubt sent a specimen is the Finger Cherry (*Rhodomyrtus macrocarpa*), the fruit of which contains a sapo-toxin and is well known and dreaded in North Queensland as being capable of causing blindness in people who may eat too freely of it. This is the first notice, however, that has come under my notice of the plant being suspected of causing trouble amongst live stock by their browsing on the foliage, and it would seem that the poisonous principle was contained more or less in all parts of the plant. Referred to the Agricultural Chemist (Mr. J. C. Brünnich), that officer reported—"The presence of poisonous saponins in the fruit has been proved and there is bound to be some of this substance in the leaves where all these bodies are formed."

Writing from Toowoomba to the Chief Inspector of Stock, the local inspector (Mr. R. O'Bryen) states, under date 28th July, 1921, "I enclose samples of a weed received from Mr. George H. Anderson, of Kingsthorpe, who blames it as the cause of the death of a horse of his which had eaten of it."

From coloured illustration in Curtis's "Botanical Magazine."]

PLATE 38.—SNAKE WEED (*Strachytarpeta dichoroma*).

The weed is the Henbit or Dead Nettle (*Lamium amplexicaule*), a common European and American weed naturalised in Australia but commoner in the southern States than in Queensland. It has been naturalised here for a number of years, but so far it has not asserted itself as a particularly aggressive species. Recent feeding experiments carried out in New South Wales and detailed by Dodd and Henry in the "Agricultural Gazette of New South Wales" for May, 1921, have shown the plant capable of producing staggers in stock. This is remarkable, as the weed is one that is common both in Europe and America and no cases are recorded against it in those countries.

It was also received last year from a farmer at Pratten (Mr. Chas. Baker) with the report that he suspected it of being poisonous. At that time, unfortunately, we knew nothing of the plant's bad qualities, and it is only within the last few months that its poisonous character has been proved.

Similar remarks apply to another very closely allied plant and a common weed in Queensland, viz., the Stagger Weed (*Stachys arvensis*). This weed in Australia is almost universally looked upon by stockowners as dangerous to working or travelling stock of any description, yet nothing of this character is heard about it in other parts of the world, though it is an abundant weed, practically speaking, over the whole of the temperate regions of the globe.

THE SASSAFRAS TREE.

Since the article that appeared in the July issue of the Journal dealing with the Yellow Sassafras (*Doryphora sassafras*) several settlers from the Atherton tableland have written stating that sassafras trees are common in the Northern scrubs, whereas the article in question states they do not occur north of Brisbane. The matter was referred to the Government Botanist, who states that the Northern sassafras trees, of which there are more than one kind, all belong to distinct species to the Southern one and that figured in the Journal, though the commonest belongs to the same family and is closely allied. The common Northern tree is *Daphnandra aromatica*, which differs from the *Doryphora* in leaves and floral structure.

POISONOUS "MILK WEED" (PRATIA ERECTA).

Mr. J. H. McCarthy, stock inspector, Beaudesert, reports:—

"A grazier on the Upper Albert River reported to me that he has been continually losing young sheep. I made a post-mortem examination of one for fly, stomach worms, and lung worms. Results negative. Stomach symptoms of poisoning were, however, strongly marked. An inspection of the farm, which is bare of grass, revealed the fact that the sheep were living almost entirely on 'milk weed' which, I have no doubt, caused the mortality in the flock. I have previously observed cases of this kind among young calves on a number of farms, death evidently being caused by eating milk weed. Young stock feeding over it for some days show no ill effects, but, later, symptoms of poisoning develop rapidly and death follows in about five or six hours. Pawing the ground and convulsions or 'fits' are marked symptoms."

A specimen of the weed forwarded by Mr. McCarthy was submitted to Mr. C. T. White, F.L.S., Government Botanist, who advises as follows:—

"The specimen sent is *Pratia erecta*, commonly known in many places as 'Milk Weed.' I have little doubt that the plant is poisonous, as reported by Inspector McCarthy, and I am much indebted to him for his remarks, which are interesting and worthy of being put on record."

Forestry.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 6.

THE COONDOO (*Sideroxylon Richardi*).

Common Name.—The common name we have adopted is used in parts of the Wide Bay District and is applied to the tree because it is plentiful on Mount Coondoo. It is also known as "Sweet Bark" in allusion to its sweet astringent bark.

Derivation.—*Sideroxylon* from Greek *sideros*, iron; *xylon*, wood (alluding to the hard wood of some species); *Richardi*, after A. Richard.

Description.—A tree attaining 130 feet in height and a barrel diameter of about 3 feet. Barrel sometimes slightly flanged at the base. Bark brown, rather rough and somewhat scaly, shed in large irregular pieces; when cut, dark red and exuding a milky juice; measuring $\frac{5}{8}$ inch thick on a tree with a barrel diameter of 2 feet.

Young shoots and parts of the flowers covered with fine hairs. Branchlets fairly thick. Leaf stalks $\frac{3}{8}$ to 1 inch long. Leaves alternate, mostly crowded towards the ends of the branchlets, oval or elliptical, rounded, obtuse or occasionally drawn out into a point at the apex, especially in Northern specimens, midrib and sometimes the lateral nerves visible on the upper surface, but both are more prominent on the underside, where also numerous and fine net veins are often prominent; measurement of leaf blade, $2\frac{1}{2}$ to $5\frac{1}{2}$ inches long, twice to three times as long as broad. Flowers in clusters of 2 to 7 (seldom reduced to 1) in the forks of the leaves. Stalks of individual flowers $\frac{1}{8}$ to $\frac{1}{2}$ inch long. Each flower measures about $\frac{1}{5}$ inch long; the outer part, the calyx, consists of 5 broadly oval or nearly round lobes, which are sometimes finely hairy and measure about $\frac{1}{8}$ inch long; generally there are 3 outer lobes overlapping 2 inner ones. On the inside of the calyx is the corolla (the combined petals) which is broadly cylindrical or cup-shaped, measures about $\frac{1}{5}$ inch in length, and is divided to about the middle into 5 lobes. Stamens 5, included in the corolla, each stamen situated about or below the middle of each corolla lobe. Alternating with the stamens are 5 slender staminodia (undeveloped stamens). Ovary (in the centre of the flower) egg-shaped, often covered with very fine down, generally 5 or 4 celled, tapering into a hairless style about $\frac{1}{10}$ inch long. Fruit narrowly oval, black when ripe, surmounted by the short persistent style, about $\frac{3}{4}$ inch long, the outer fleshy part enclosing 1 or sometimes 2 seeds. Seeds narrowly oval, about $\frac{1}{2}$ inch long, the scar (hilum) narrow and more than half the length of the seed.

Distribution.—Scrubs of the coastal area of Queensland from the Tweed River in the South to the Barron River in the North. New South Wales, from Illawarra to the Tweed River. Confined to Australia.

Uses.—The timber should be useful for cabinet-making and general indoor work.

The late F. M. Bailey in his "Comprehensive Catalogue of Queensland Plants" quotes Dr. Jos. Lauterer to the effect that "The sweet astringent bark might be useful in throat diseases."

References.—*Sideroxylon Richardi*, F. von Mueller, in "Systematic Census of Australian Plants"; *Achras laurifolium*, F. v. Mueller, in Bentham's "Flora Australiensis," vol. IV., p. 282; *Sideroxylon laurifolium*, (Rich.), Benth. and Hook. in Genera Plantarum IV., vol. 2, p. 665; F. M. Bailey in "Queensland Flora," part III., p. 955.

The name *laurifolium* had already been preoccupied in the genus for two extra-Australian species, and for this reason Mueller's name of *Sideroxylon Richardi* is adopted.

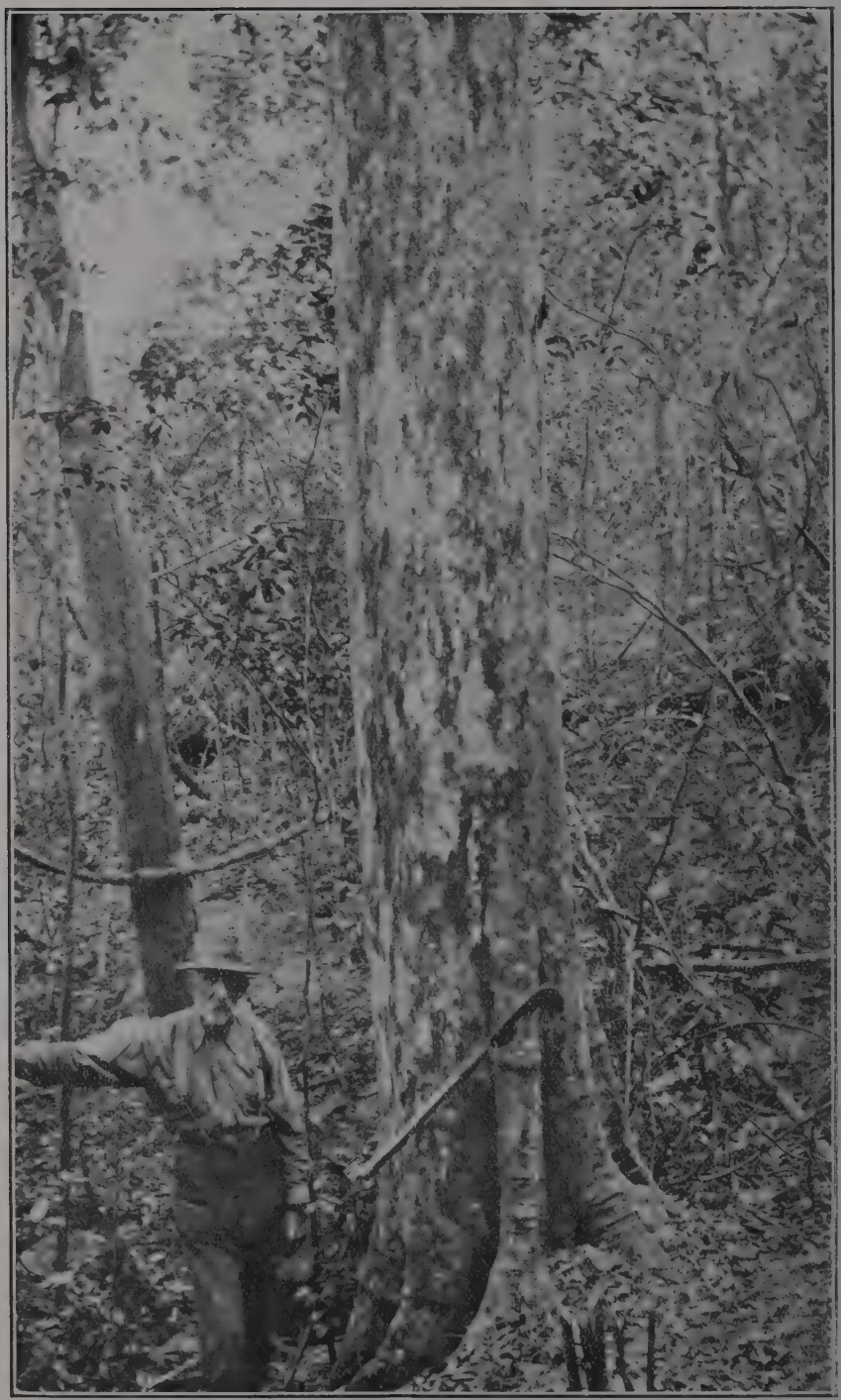


Photo. by W. D. Francis.]

PLATE 39.—THE COONDOO (*Sideroxylon laurifolium*), KIN KIN SCRUB.

Photo. Dept. Agriculture and Stock.]

PLATE 49.—THE COONDOO (*Sideroxylon laurifolium*): SHOWING LEAVES, FLOWERS, FRUIT, AND SEED.

Entomology.

BANANA BEETLE BORER* INVESTIGATIONS.

[FIRST PROGRESS REPORT.]

BY JOHN L. FROGGATT, B.Sc., Entomologist in Charge of Banana Beetle Borer Investigations.

INTRODUCTORY.

The literature on the subject of the Banana Beetle Borer is not extensive and, in so far as systematic research work is dealt with, it is scanty. There is, therefore, very little subject-matter available to guide the investigator in deciding what should be included and what excluded when devising a systematic scheme of work.

The first matter for study must necessarily be the development, habits, &c., of the beetle, in order to ascertain any period, or periods, in its life cycle during which it is more vulnerable to natural enemies, or more readily subject to treatment, than during the remainder of its life cycle. This entails a very careful and close study of the insect, both in the laboratory and in the field. As the necessary laboratory facilities are not yet available, a considerable portion of the investigations has been either impracticable, or, if not, beset with difficulties.

The following account of the field and laboratory investigations, carried out from 1st January to 30th June, 1921, cannot be looked upon as exhaustive on any portion of the subject, but is rather in the nature of a Progress Report, intended to show what has been done and the results so far obtained.

THE EGG.

The egg has only been found on a few occasions in the field, being difficult to detect. In February, 1921, a single egg was found lying loose amongst the decaying leaf-bases at the crown of the corm of a living plant. In the same month a single egg was found deposited in a slight furrow in the side of a larval tunnel in an old corm lying on the ground. At the end of May, 1921, a number of eggs were found deposited in corm and old stems lying on the ground.

In the office, in April, 1921, two eggs were found in a small piece of corm on which beetles had been feeding in a tin; one was deposited in a small furrow in a slight indentation on the surface of the corm; the other was just below the surface. At the end of May and throughout June, 1921, a large number of eggs were obtained from pieces of corm on which beetles had been feeding in tins.

In every case so far noted the eggs have been laid singly and, where below the surface, in a slightly curved burrow only large enough to hold the egg, which is just beneath the surface.

From observations made on cut-stems lying in the plantations, it was found that the site for the deposition of the egg, in such cases, is usually within two feet of the cut end, and just beneath the surface. In cases where corm is attached to the stem, the site of deposition of the egg is apparently close to the crown of the corm.

* Cosmopolites sordida, Chevr. (Curculionidæ).

From the eggs obtained, as stated above, a great deal of valuable information is being obtained. The first sign of the development of the larva within the egg is made manifest by the appearance of the jaws as fine brown lines; the period elapsing from the time of deposition to this stage of development was from thirteen to eighteen days, as noted during May and June, 1921. The period subsequently elapsing until the emergence of the first larva has been found to be from one to three days. The total period, however, from the deposition of the eggs to the emergence of the first larva was from seventeen to twenty-one days during the same two months.

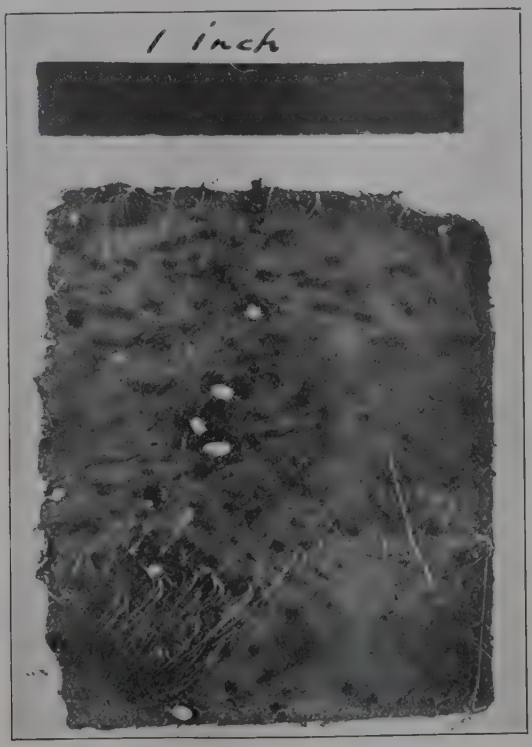


PLATE 41.—EGGS C. SORDIDUS IN SITU IN CORM.

It has been found difficult to breed from the egg after transference, owing to fungus growths developing in any incision made in the plant or piece of corm.

THE LARVA.

The larva, during the warmer portion of the year, has been found to take from three to four weeks to reach maturity. Larvæ collected in the field in April and May, 1921, being then in a well developed state, remained in the larval form for more than four weeks before pupating, after transference, in the office.

In the stools, the larvæ feed principally on the corm (or bulb) of the banana plant, although sometimes they are found to have tunnelled well up into the central core of the stem; this was more commonly

observed in the stems after removal of the bunch, when decay had begun to set in. When found infesting cut-stems, the central core was always found to be the principal, if not the only, area attacked by the larvæ.

The damage which a single larva can do is considerable. In one case the corm of a sucker of Lady's Finger banana, about two inches in diameter, was found to have had practically the whole of the centre eaten out by a single larva.

It is extremely difficult to arrive at a fair comparison between the amount of damage done and the degree of infestation, owing to the variation in habits shown by the larvæ, which sometimes have been found to remain in one area and eat that right out, whereas at other times they tunnel in all directions individually.

PUPA OR NYMPH.

From nymphs collected in the field, the beetles have been found to emerge in from two to seven days; the age of the nymphs, when collected, was unknown. The nymph from a larva maturing in corm in the office at the latter end of May, 1921, occupied fourteen days in reaching maturity.

The pupal chamber in the corms has been found always to be situated below ground level, close to the surface of the corm at the end of a larval tunnel. The position of the pupal chamber in relation to the axes of the corm varies: it is sometimes found parallel with the horizontal axis, sometimes slightly inclined to it.

In cut-stems the position of the pupal chamber varies considerably. Although it is generally just under the surface, it has been found as far as two inches in from the surface.

Occasionally a few strands of fibre are found in the open end of the pupal chamber; so far as has been observed, this is exceptional.

As the pupa approaches maturity it changes colour from a pale yellow through light brownish yellow to a light reddish brown, which is generally the colour of the beetle on emerging.

THE BEETLE OR IMAGO.

After emerging from the pupa, the beetle lies dormant in the pupal chamber for several days, by which time the tissues have hardened and the colour changed to a very deep reddish brown or even black. Immature imagos, removed from corms and cut-stems, have been found to lie dormant, when placed in tins with corm over earth, for from four to five days before showing any marked inclination to move or feed. In nearly all cases the beetles had developed their full (black) colour within seven days. The mortality amongst immature beetles transferred in this way is very high.

Notwithstanding that the beetles have large and well developed wings, the experiments so far carried out to test their power of locomotion in air have not demonstrated that they fly. Neither by any method so far tried has one been able to be made to fly.

Ordinary white light exercises a strong deterrent action on the beetles, which, upon exposure to it, crawl away into any dark place; if they be placed on soil and then so exposed to the light, they will work their way beneath the surface and remain there. A number of coloured lights are being tested, particularly to ascertain, if possible, if there be

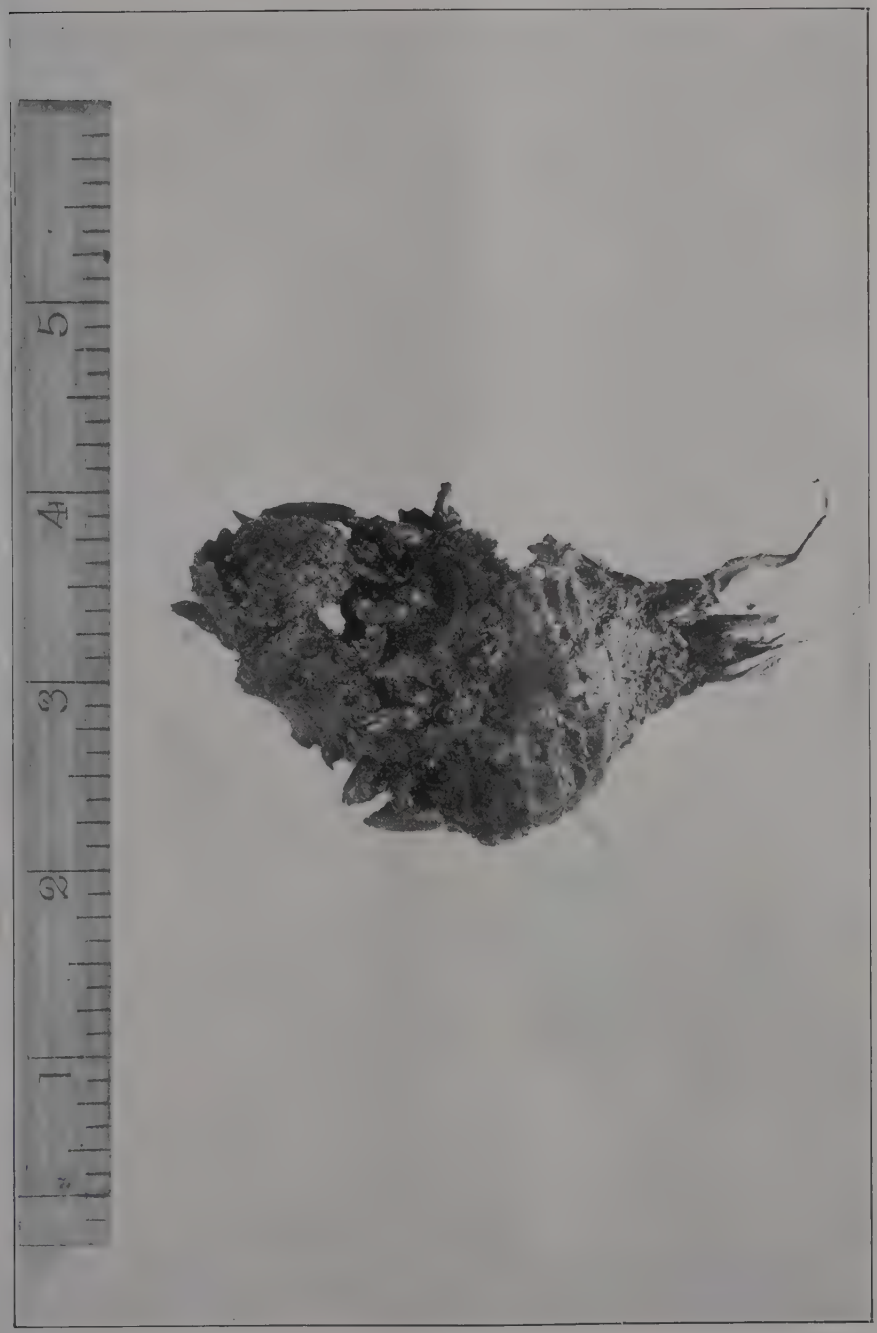


Plate 42.—Work of Two Larvæ of C. Sordidus on Banana Sucker.—Exterior View.

PLATE 43.—WORK OF TWO LARVÆ OF C. SORDIDUS ON BANANA SUCKER.—INTERIOR VIEW.

a colour under which the beetles, even if not markedly attracted to it, will not be driven away. No marked positive results have, so far, been obtained.

Several oils and essential principles are being tested in order to ascertain any attractive or deterrent influences exercised by them on the beetles. All those tested to date have shown a more or less marked deterrent influence, which, however, has only been exercised over a very short distance and for only a very short space of time.

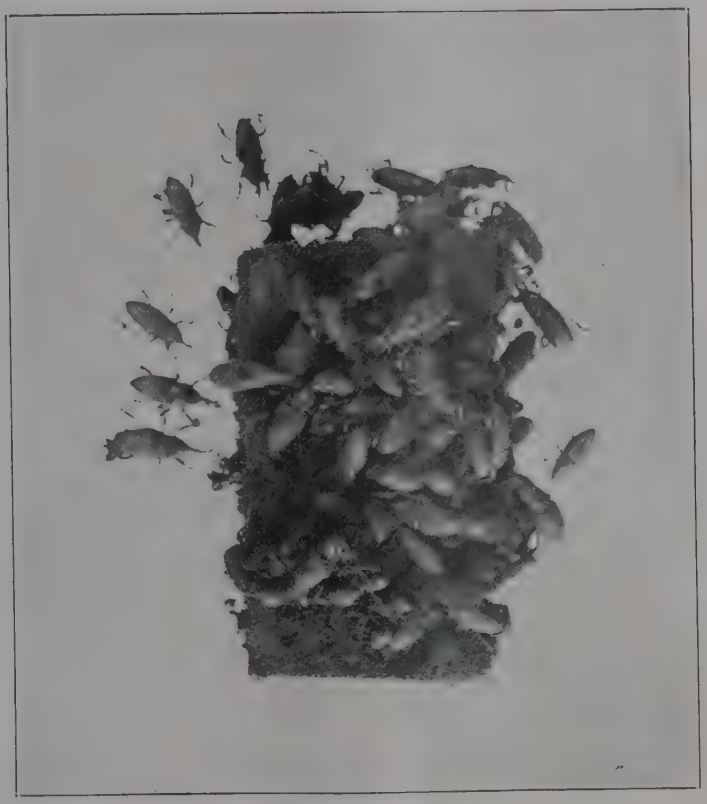


Plate 44.—The Beetle.

A detailed account of the tests on the powers of locomotion and with the oils and coloured lights will be given at a later date, when a greater degree of conclusiveness has been reached than at present.

The food of the beetle consists of the corm or the material of the rotting stems. In most areas, rotting stems, *particularly* those lying on the ground, are always found to contain beetles, often in numbers. The amount of moisture in which the beetles live in these situations is remarkable. The beetles may not be present in the rotting stems solely for the purpose of feeding or propagation, but that of sheltering.

In order to ascertain the longevity of the beetles, a number have been kept in tins containing fine earth and corm; the earth absorbs any moisture from the corm on which the beetles feed. The following table shows the percentages alive on the dates given, the percentage being taken to the nearest whole number:—

Lot.	Approximate date collected, &c.	Number collected.	% alive on 3-3-21.	% alive on 22-3-21.	% alive on 4-4-21.	% alive on 19-4-21.	% alive on 28-4-21.	% alive on 9-5-21.	% alive on 20-5-21.	% alive on 25-5-21.	% alive on 27-5-21.	% alive on 8-6-21.	% alive on 10-6-21.	% alive on 13-6-21.	% alive on 16-6-21.	% alive on 20-6-21.	% alive on 22-6-21.	% alive on 24-6-21.	% alive on 27-6-21.	% alive on 29-6-2n.
A ..	29-1-21	38	78	74	68	68	66	63	63	61	61	61	61	61	61	61	61	61	61	
B ..	7-2-21	132	97	69	54	34	32	31	31	31	31	31	31	30	30	30	30	30	30	29 5
C ..	12-2-21	281	83	56	52	37	36	36	36	36	35	34·5	34·5	34·5	34·5	34·5	34·5	34·5	34·5	34 5
D ..	20-4-21	37	..	..	..	..	100	92	89	89	89	89	89	89	89	89	86	86	86	86
E ..	27-4-21	16	..	..	..	..	100	88	56	56	56	56	56	56	56	56	56	56	56	56
F ..	5-5-21	87	..	..	..	..	..	100	100	100	100	99	99	99	99	99	99	99	98	98
G ..	21-5-21	379	..	..	..	..	..	..	100	99	99	99	99	99	99	99	99	99	99	99
H ..	24-5-21	26	..	..	..	..	..	..	..	100	100	100	100	100	100	100	100	100	100	100
I ..	4-6-21	324	..	..	..	..	..	..	..	..	..	100	100	100	100	99	99	99	99	99

With the exception of "Lot E," which were bred from nymphs, all the beetles were collected in the plantations, their age when collected being, of course, unknown. These observations show that the length of life of the beetle is of considerable duration.

The only insect-enemy so far discovered is the Elaterid larva first reported by Tryon from Cooroy. This predaceous insect has not been found outside the Cooroy district. A single larva was met with on the 25th February, 1921, with a partially consumed banana beetle in its jaws.

On several occasions it has been observed that, immediately after heavy rain, the number of beetles found under corm baits was very much less than before the rain. Generally, forty-eight hours after the cessation of rain the number of beetles found under the baits again begins to increase. So far the location of the habitat of the beetles at these times has not been definitely determined.

Under ordinary conditions, a proportion of the beetles shelter and move below the surface of the ground, as shown by the fact that baits laid adjacent to stools, and from under which the beetles have been removed in the morning, have been found to have additional beetles underneath them at midday; and after removing this second lot of beetles, the baits have been found to have further additional beetles underneath them in the late afternoon. An alternative explanation as to their source and mode of access to the baits appears to be excluded on considering the fact that the beetles have been proved to be abhorrent of ordinary light, and, though a close observation has been made, have never been found crawling on the surface of the ground during the hours of daylight, or at any time traversing the air.

OCCURRENCE.

In plantations in which, generally, the infestation is very marked, suckers are commonly found in which the larva has eaten out the centre of the corm and tunnelled upwards through the central core of the

stem to a height of about four inches above ground level, where it has eaten its way right round the stem. These suckers, naturally, look very unhealthy, and if an attempt be made to pull them out of the ground, they break off at this ring-tunnel; a well-developed larva is then usually exposed.

An unusual habit of the larva, observed so far only in one locality, is that of tunnelling upwards right through the centre of the stem of young suckers. This has been observed on the higher ground as well as on the lower levels. Although not of common occurrence, it is sufficiently prevalent to be noticeable.

The infestation of the beetle-borer is equally bad in plantations situated on the high ground and on low-lying levels, and is as severe on the ranges as on the seaboard.

In older plantations where the infestation is slight, the depredations of the larvæ may be confined to old corms in the centre of the stools or cut-stems lying on the ground. This does not mean, however, that such will necessarily be the case under all circumstances.

So far as has been observed, there does not seem to be any marked difference in either the relative frequency of, or the relative injury by, the pest with respect to "Cavendish," "Lady's Finger," or "Sugar" banana plants.

Corms dug out or stems with corm attached, left lying on the ground, may serve as breeding centres for a considerable time. In one case, in an area in which the beetles had been long established, corms which had been dug out four years previously and left lying on the ground were found to contain a number of larvæ and nymphs in addition to over 100 beetles, many of which latter were immature.

CONTROL.

It has been impracticable to enter upon investigations into means of controlling the pest to any extent. The only recommendations that can be made are, in effect, those previously published.

Wherever infestation is found in the stools, dig out and destroy all infested material and lay "split-corm" baits flat on the ground in the centre of and just outside these stools. Examine the "baits" at least each morning, and collect and destroy the beetles that will be found on the underside of the bait and on, or just underneath, the soil under the "bait." It has been noted that about three days elapse before the corm "baits" attain their maximum attractive power. It is advisable to destroy the baits after a fortnight has elapsed, in order to prevent any larvæ, from eggs deposited in the corm, from maturing. Cut-stems and plants that have fallen out of the stools must be examined from time to time, and where found to be infested must be destroyed.

The spreading of the pest into clean plantations is most carefully to be guarded against. When obtaining suckers for planting, the greatest care should be taken to ascertain that the plantation from which they are to be secured is free from banana beetle infestation. Eggs may be deposited in the suckers before or after removal from the stool, and the presence of the eggs, the detection of which is extremely difficult under the circumstances, if not impracticable, or even larvæ, be not noticed at the time of receipt.

Another factor that is too often lost sight of—a particularly important one when laying out a new plantation—is the presence of old banana cultivation adjacent to the area selected. It has been noticed that new plantations have been laid out adjacent to, and even alongside

of, old and often discarded banana cultivations in which the beetle-borer is still active. The beetles will ultimately spread from such old areas into the new plantations. In such cases the old area should be most carefully examined, and, if beetle-borer infestation be found, "baits" should be laid around the edge of, and, as far as possible, throughout the old area; all the beetles so "trapped" must be destroyed. It is to the growers' own advantage to dig out and destroy the plants in such old areas whenever opportunity offers.

NOTE.—This account of banana beetle borer investigations was issued as a special Bulletin by the Entomological Division of the Department of Agriculture and Stock at the Brisbane Exhibition, 9th August, 1921.

SPECIAL CATTLE FATALITY IN THE MARANOA DISTRICT, AND ITS RELATION TO THE LARVÆ OF PTERYGOPHORUS ANALIS, COSTA.*

BY HENRY TRYON, Entomologist, Department of Agriculture and Stock.

The peculiar fatality (Note 1) experienced by cattle, and attributed to their having developed a strange appetite for a special insect (spoken of erroneously as a "caterpillar") that has been reported from Roma during the present month (July, 1921), was experienced by graziers in a considerable area of the Maranoa district in 1911, 1913, and 1914, in annually increasing extent, occurring latterly as far as Moola Zembla Creek, beyond Westgrove, to the north of Roma, and to Waterhole Creek in the Surat district, to the south.

This occurrence at that time, as during the present season, was moreover restricted to a definite area of country characterised by the growth of a certain eucalypt tree—the Silver-leaved Ironbark with opposite leaves (*Eucalyptus melanophloia*, F. v. M.). This tree is the especially favoured food-plant of the insect now to be described. A second one to which it is much less addicted to feeding on is the local "Molly Gum." (Note 5.)

THE INSECT.

The insect, denominated a caterpillar, is not the young of a moth or butterfly, as is implied in the definition; but the young, or "grub," of a large hymenopterous insect—one of our Sawflies (so termed from the fact that the female is endowed with a saw-like organ that is employed in placing its eggs). It was named in 1864 by an Italian entomologist, G. Costa, *Pterygophorus analis*, owing to the male individual having feather-like feelers (antennæ). In addition to the saw-fly grub, then, we meet with the insect in other phases of existence—the winged insect, the egg, and the pupa or nymph.

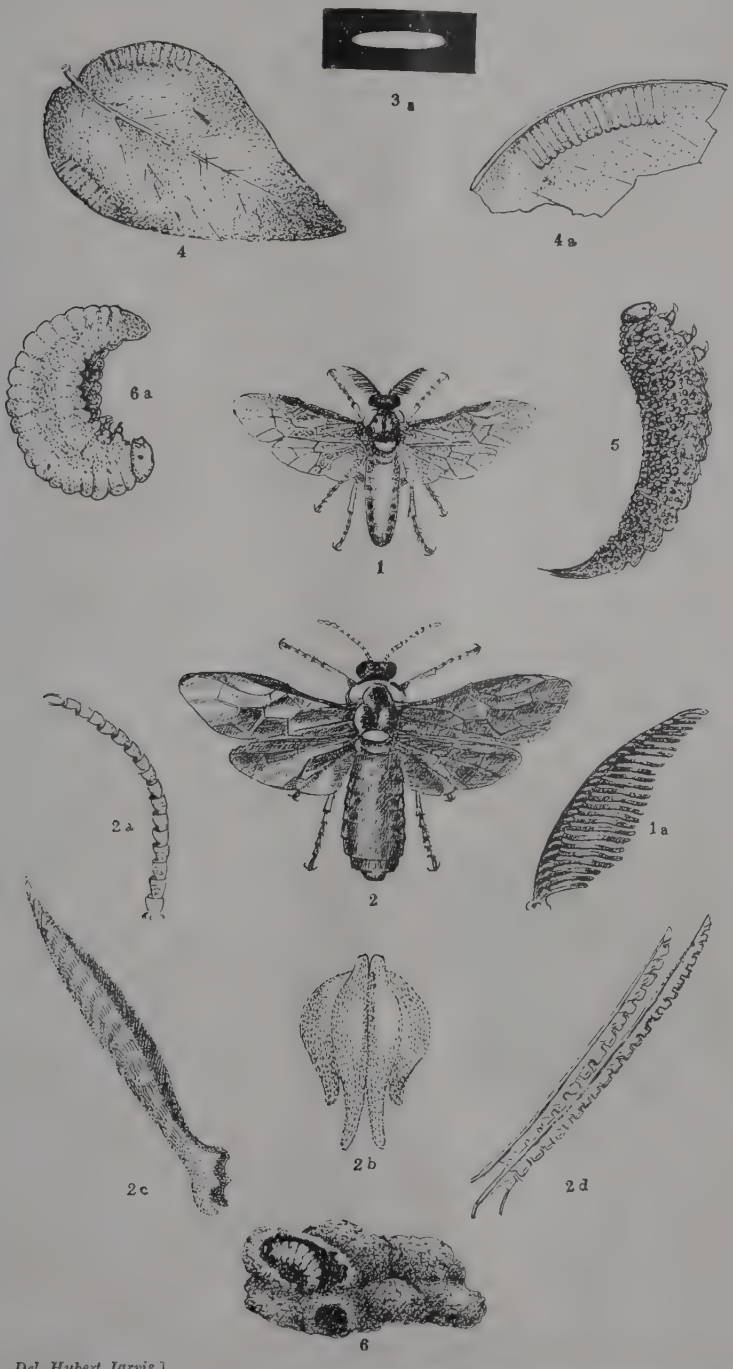
DESCRIPTION OF INSECT AND HABITS.

Adult.—The Sawfly, *Pterygophorus analis, Costa* (Plate 45, Figs, 1 and 2). This is a glossy blue and yellow insect with the shining wings appearing almost black when folded, but really smoke-coloured, darker in front. It has the head and central shield of the thorax and some parts beneath dark steel blue. The female—the larger insect—measures about 1½ cm. in length, and has a wing expansion of just twice this amount. It has its feelers threadlike. On its yellow abdomen beneath is the groove containing the saw-like organ and other instruments that are used in placing the eggs. The male (Fig. 2) on its part measures 1¼ cm. in length, with wings of the same relative length. It is more slender than its consort, and has the black feelers widely feathered on one side.

Egg.—The egg (Fig. 3) is an oblong, very delicate pale green object. The female lays several at a time—twelve or more. These it inserts into the tissue intervening between the two leaf surfaces side by side in a row along the leaf-edge (Figs. 3 and 4). In effecting this object, it settles astride on the latter, and exserting its saw, cuts a cleft for each egg, and then passes an egg into this. (Note 2.)

Larva.—The larvæ hatching from single rows of eggs at one time feed on the leaf where born, congregated together side by side, thousands of leaves on individual trees affording the different groups sustenance. Meanwhile, they may invade leaf

* This memorandum was submitted at the request of the Minister of Agriculture, and although based on investigations and inquiries made in 1914, it has application to the present occurrence in July, 1921. A special show-case illustrating fully the insect and its life history, the work of Hubert Jarvis, has been exhibited several times since the earlier date at the annual expositions of the Queensland National Association.



Del. Hubert Jarvis.]

PLATE 45.—SILVER-LEAF IRONBARK SAW-FLY (*Pterygophorus analis*), G. Costa. [Tenthredinæ.]

after leaf. When fully grown (say, late in June) they crawl, forming a numerous host, along the branches and down the tree trunk to the ground, where they may congregate literally in heaps about its base, either to eventually enter the soil near at hand or to succumb to wet and cold (Plate 46). They are green unclothed caterpillar-like objects, with reddish-yellow horny heads; the bodies gradually taper backwards to a point. (Note 3.)

Nymph and Cocoon.—Having entered the ground, the larvæ still congregated together, form cocoons of a very tough, gummy, dark-coloured material. These are ordinarily placed side by side, and together they appear like blocks of exceedingly large-celled honeycomb. However, when the "grub" enters sandy soil to transform, its cocoons are made isolately, or two or three only occur adherent (Fig. 6). In these dwellings, one in each, the grub passes to the pupal state. In this it is a pale green object, lighter anteriorly, with the four wings and legs packed up in cases lying alongside the sides of the body. Under ordinary circumstances, the adult saw flies, male and female, emerge from the ground late in August or during the succeeding month. However, the time of appearance may be greatly retarded should conditions of drought obtain. This remark also applies to the development as nymphs from larvæ.

The larva and nymph, when crushed, have a strong odour of eucalyptus, and evidently some eucalypt oil finds presence in its body fluids.

CONDITIONS INFLUENCING PREVALENCE.

(1) *Opossums.*—When, nearly forty years since, the Maranoa district was being traversed, it was observed that these animals were very numerous indeed, and that they specially favoured the young foliage of the Silver-leaf Ironbark (*E. melanophloia*, F. v. M.) in feeding; in fact, the foliage they would render quite scanty. The same trees also yielded them abundant camping places. It has been above pointed out that it is within the leaf tissue, the younger especially, that the eggs of the saw fly are deposited. Thus, whilst feeding on this vegetable diet, they would also inevitably consume the "caterpillar" eggs that it contained; similarly, in reducing the foliage they would limit opportunities for egg-laying also. This being so, the enormous destruction of opossums in the Maranoa district during the last decade, and the prevalence of the saw-fly larvæ, and so of this cattle fatality, stand in the simple relation of cause and effect.

(2) *Tachinid Fly Parasite.*—A small dipterous insect, somewhat resembling an ordinary house fly, has been bred from the *Pterygophorus* larva. There is reason to conclude that under some circumstances, and in some seasons, this parasite acts as a formidable natural enemy in preventing the ordinary numerical development of the insect. On the other hand, there are conditions that act prejudicially to it, and so fail to restrain this. So, then the "caterpillar" does not uniformly increase in numbers from year to year under the operation of other favouring circumstances.

(3) *Meteorological Conditions.*—Moreover with the prevalence of drought, although then the saw-fly larvæ ("caterpillars") may enter the ground, to build cocoons and transform to pupæ, the realisation of this stage in their metamorphosis may be long suspended, since then they still persist within these constructions, in the grub condition. During the several months that may be thus occupied without the ordinary transformations taking place, many succumb to fungus and other diseases.

(*b*) When, on the other hand, rain and humidity are experienced, as the "caterpillars" descend from their feeding grounds in the tree tops and are reaching the ground, so prejudicial are their effects on them that myriads may succumb and decay. This may bring about fatality in stock, whilst it considerably abridges the insect's ordinary prolificness.

(4) *Natural Enemies—Birds.*—We have alluded to the operations of opossums and tachinid parasites. The potential controlling influence of insectivorous birds must not be overlooked. Their service can alone, however, be exercised when they locally exist in numbers. The paucity of such friendly agents in the Maranoa district, as compared with what occurred in years past is, however, such that to-day the check that birds might exercise on the number in which these pernicious insects occur is little indeed.

EATING OF THE INSECT BY CATTLE.*

In the absence of personal observation†, allusion may be made to abundant testimony, as establishing the fact, not only that cattle eat the so-called "cater-

* When the cattle fatality was first remarked in the Roma district, it was attributed to "cyanide poisoning" (accidental); the part played in it by insect ingestion must therefore be shown.

† Local inquiry on the part of the writer in 1914 was alone practicable when the insect had already temporarily disappeared.

Del. Hubert Jarvis.]

PLATE 46.—SILVER-LEAF IRONBARK SAW-FLY (*Pterygophorus Analis*) G. COSTA. (Tenthredinæ). Caterpillar Stage.

pillars,'' but that they may also manifest special keenness in exercising this abnormal appetite for them, as they occur congregated at the immediate feet of their host-trees, the Silver-leaved Ironbark, and Molly box trees—Eucalyptus sp., to a much less extent.

The fact that it is an abnormal appetite is evident from the experience of the 1911 occurrence, and from the 1914 one especially, ''There is plenty of grass . . . my stock have a craving for green feed, and take to the caterpillars'' (S. Sidney, August, 1911). The cattle ''had plenty of good grass, but much preferred eating caterpillars'' (J. C. Boyce, 26th August, 1914).

It is evident, too, that, however this strange habit has originated, the cattle eventually display especial eagerness in securing and consuming the insects. ''I have seen the animals deliberately eating the grubs,'' stated J. D. Thomson. ''Cattle fight for a place in their efforts to satisfy their craving for the larva'' (S. Inspector J. E. Smith). Again, ''When the cattle get a taste for them they go nearly mad; they turn from tree to tree licking them off the trees a foot at a time'' (S. S. Bassett, August, 1914).

EATING THE DEAD INSECTS.

Testimony as to cattle consuming the living insects is not quite conclusive. It is very significant, however, having regard to the effects produced, that they commonly partake of the dead ones. It was reported concerning experiences at Westgrove, in 1913, that the cattle victimised were ''eating heaps of dead caterpillars'' (S. B. Harding); again, ''I personally saw cattle eating up the heaps of rotting caterpillars —stinking heaps of caterpillars'' (Ib.)

Staff Stock Inspector J. Taylor elicited also similar testimony in 1914—*i.e.*, that ''The caterpillars die in heaps and are licked up by the cattle after they become a putrid and semi-putrid mass.'' (*Note.*—The writer has himself observed the masses when they had dried up.) (Note 4.)

OCCURRENCE IN ''STOMACHS.''

The insects being of a soft consistence, with somewhat tough skins, but having hard chitinous heads, would, it might be anticipated, if eaten, generally escape detection on any ordinary examination of the paunch-contents of the cattle that had eaten them. The following testimonies are, however, decisive of their occurrence therein:—(1) ''We have found the ' caterpillars ' in the paunches of the dead ones'' (R. C. Lethbridge, 1913); (2) ''I opened about sixty-seven head here (Toogoombilla), and half of them had the heads of caterpillars in their paunches'' (D. Penthalwick, 1914); (3) ''I have found them in the paunch'' (J. W. Ward); (4) ''I opened several of the dead bullocks, and some were full of caterpillars; others had only a few in their stomachs'' (J. C. Boyce); (5) ''I have found portions of them in one cow's stomach, but I shot her before she got to the dying stage'' (S. R. C. Hardy).

ABSENCE OF INJURY ON EATING.

It would appear that not only may the insects be present under circumstances under which they might be partaken of, but also that, this being so, they may on occasion eat them with impunity. Mr. D. Smith, of Stewart's Creek, Roma, on this point stated:—''Cattle have been in a paddock very much infested with ' caterpillars,' and only a few died (2 miles away, 60 out of 100 head died). . . . I find that on parts of the run the cattle do not die so much, although the ' caterpillars ' are just as thick'' (as elsewhere), and ''I have seen the cattle eat the ' caterpillars ' and they are still living.''

Again, Stock Inspector J. E. Smith stated in 1914 that he had heard that the ''caterpillars'' occurred at Tarrawanya, 35 miles south-east from Roma, but had not learnt of any casualties in connection therewith. Without fatality, too, he had himself seen, whilst specially patrolling the Surat cattle-grazing area, in August, ''occasional patches of stripped ironbark trees, evidences of ' caterpillar ' invasion.'' (*Vide* also ''Diet Deficiency,'' p. 213.)

FACTS CONFIRMATORY.

This evidence, bearing on the generally locally admitted conclusion that the ingestion of the insects alluded to has been the cause of the sickness and death of cattle experienced, finds corroboration in the fact that on moving the cattle from the country in which the insects and their food-trees occur, this loss and injury cease. ''Last winter (1913) about 100 head of cattle died from the effects of eating ' caterpillars ' on Westgrove. . . . Three years previously (1911) about the same number died from the same cause. This winter (1914) I shifted all the sick from the infected country and had no losses'' (S. C. R. Harding).

(So also with regard to influence on occurrence of host-tree destruction.)

FACTOR OF DIET DEFICIENCY, &c.

It is well known that cattle under certain conditions and circumstances exercise abnormal appetites for one object or another—bones especially—as do also human beings in the case of soil or grit. Partaking of insects living or dead and decayed comes within this definition, and calls for explanation to be understood. In this connection a testimony as to the possible action of salt (sodium chloride) may therefore have some significance:—"I have lost 20 head of cattle through the pest. Mr. ————, one of my next neighbours, lost 75 head. In one paddock *where I salted*, they (the ' caterpillars ' H.T.) are very thick, and the cattle don't seem to notice them, although they (the cattle, H.T.) are running from tree to tree looking for them in the paddock where I had no salt" (J. Jenkins, Timor, August, 1914).

The instinctive habit of endeavouring to overcome irritation in the alimentary canal from the presence of entozoa, by consuming non-food substances, must, too, be considered in this connection.

FACTOR OF WEATHER CONDITIONS.

In the season of any year when the insects are prevalent, and wet damp weather is experienced, the special loss in cattle now under consideration most prevails. This has been especially commented upon by Alexander Cummings, of Mount Beagle. When it is considered that the death of the insects arises, too, under the same circumstances, this relation may be understood, if, indeed, not accounted for.

AGE OF CATTLE AFFECTED.

The experience of graziers has been that it is principally young cattle that have evinced the peculiar fatality. "We have lost principally calves," stated J. D. Thomson. Again another testified, "I lost five young cattle" (A Cummings). Another, as to the animals affected, "They are principally young cattle up to 2 years old and in the best condition." A settler at Stewart's Creek (D. Smith) deposed, further, "Six head of weaners died out of eighteen, none of seven grown cattle."

This is not, however, the universal experience. Thus we learnt from J. C. Boyce, of Mooya, that he lost 40 bullocks from the cause alluded to (partaking of saw-fly grubs), several of which he opened. Again, referring to a particular holding, J. O. Thomson, of Kilmorney, stated, "I have seen 50 to 60 head of 2 to 3 year old steers dead on an average of about 4 to 5 square miles."

SYMPTOMS ARISING FROM THE INSECT DIET.

The clinical symptoms are a subject for the veterinarian to describe. Those that have attempted to picture them, in the absence of the necessary technical knowledge and experience, have failed. Evidently they are rather slowly realised, but take the form of much pain and distress. They certainly, according to all testimony, result in marked cerebral phenomena.

The patients "become restive" (J. D. Thomson); "they appear to suffer great pain" (J. W. Ward); "the affected beast becomes quite mad. It is very dangerous to approach" (Ib.); "they get staggers, also will charge very fiercely if one goes within 50 yards of them" (S. R. Harding).

The pathological state, revealed on post-mortem examination, had again only been indefinitely described when our information was elicited. This, again, is a matter for the veterinarian and animal pathologists.

With reference to the incidence of a fatal issue, it has been stated that "only very few recover after eating the caterpillars." "Three of mine recovered." stated the deponent alluded to (J. C. Boyce, of Mooya). He mentioned one animal that went without grass for fourteen days and then pulled through. "Some recover, too," stated Mr. E. D. Smith. Death, again, is rather slowly realised. Some cattle die in twenty-four hours, but usually only after a lapse of three to four days. "The time the animal eats the insects until the time of death is two to three days," stated D. G. Thomson.

SUMMARY AS TO CAUSE OF FATALITY.

1. Cattle under certain circumstances—those herein suggested above or others (a matter to be inquired into by the animal pathologist)—exercise an abnormal appetite and consume the grubs of a saw fly available in quantities, principally when dead and decaying; as also may happen with respect to true caterpillars and animal matter generally.

2. The symptoms as far as ascertained are not those arising from the consumption of ordinary hairy caterpillars (*Liparidæ*, &c.), these in the latter case being those of intense local irritation due to the presence of the peculiarly constructed hairs (so also with respect to Eucalyptus oil).

3. On the other hand, they appear to be not inconsistent with those of a generalised toxæmia when a ptomaine has become operative—a matter for the animal pathologist to decide.

MEASURES OF CONTROL.

Apart from the direct treatment of the cattle, which it would appear should be undertaken from two distinct standpoints—prevention and remedy—certain other procedures may serve to reduce the fatality that may occur.

1. *Medical Treatment.*—This is a matter for the veterinary practitioner, and possibly the difficulties with which it is fraught are not insuperable. It might be affirmed, as already suggested (p. 213), that in this regard the discovery of the origin of the abnormal appetite displayed by the cattle, and of precisely in what it consists, might point to a practical procedure for its removal or subjugation.

2. Other procedures above alluded to, being of the nature of preventative ones.

(*a*) *Local Protection of Opossums.*—Under "Factors contributory in opposition to numerical increase" of the insect. Emphasis has been made on the effect of reduction of opossum life in making for their prevalence, and how this reduction has operated to effect this result (p. 210). It is considered, then, that a close season for these animals throughout the area in which the Silver-leaf Ironbark (*Eucalyptus melanophloia*) grows and the saw fly (*Pterygophorus analis*) is using it as a host-plant, would be in the distinct interest of the grazier, whose cattle were liable to suffer.

(*b*) *Movement of Cattle from Areas of Ill-Repute.*—The host-plant of the caterpillar (saw-fly grub) grows principally in belts and patches, and in many cases it is practicable to withdraw them from these to grazing country, where the tree and its associated insect does not occur. Their pasturage on such new country need only be for about two months—last week in June to end of August. This method of safeguarding them effectively was demonstrated by S. R. C. Harding, manager of Westgrove, in 1914.

(*c*) *Destroying the Silver-leaved Ironbarks* (*E. melanophloia*, F.v.M.) in country has to be permanently devoted to cattle-grazing—by ringbarking. This has already been done to a large extent in the past. The "application for permission to ringbark," that has to be made to the local Crown Lands Commissioner in accordance with the requirements of the "*Land Act of* 1910," in Crown leaseholds is not likely to be withheld, seeing that the tree in question has no great value as a timber tree, and its local destruction would not apparently constitute sufficient forest reduction to minimise local rainfall.

(*d*) *Preventing Access of Stock to Caterpillars.*—Trees on which the insects are feeding can be recognised as such, and in practice it has been found that if boughs are placed at the bases of their trunks they will serve to debar access of cattle bent on reaching the insects that may congregate in masses in those positions.

Note.—It is anticipated that a strongly odorous substance sprayed upon the insect masses would also deter cattle visitation—"bone oil," for example. This is a matter for experiment.

(*e*) *Native Bird Protection.*—The very marked reduction in bird life in the Maranoa district, during the last three or four decades, principally brought about by "cyaniding" on the part of opossum and native-bear hunters, must be brought to a standstill, and an effort to encourage it stimulated. That special insectivorous birds destroy the "caterpillar" has not been observed by us, but that such is the case is highly probable; even the small parrots may serve this purpose.

(*f*) *Special Investigation into Pathology.*—It would seem probable that special investigation on the part of the animal pathologist are called for and likely to yield material results in reducing this cattle fatality.

SUPPLEMENTARY NOTES.

Note 1.—Although loss of stock, attributed to consumption of the saw-fly larvæ ("caterpillars"), has also been reported from other parts of the Maranoa area without details as to the number of victims, the following specific instances, in most of which this information is given, will be sufficient to indicate its seriousness:—

1911.—Reports were received as to its occurrence at Westgrove, Pinegrove, and Upper Yingerbay, 100 head (R.B.C.).

1913.—Similar reports were made with respect to Forest Vale, Stewart's Creek, Kilmorey, Westgrove, about 100 head (S.R.C.H.), Mount Beagle (A.C.), and Mr. Eden, 100 (A.C.).

1914.—In this year, again, the following losses were brought under notice:—Bungeworgorai, 16; Bungeworgorai, 30 (Mrs. L.); Roma, 15 bullocks (S.S.B.); Mooga, 30, including 20 bullocks (J.C.B.); Westgrove, several; Hutton Creek, 50 of 400 head (— McC.); East Lynne, 70-80 (J.W.W.); Timor, 20 (J.J.); Kilmorey, about 100 (J.D.T.); property adjoining Timor, 50-60 (Ib.); Stewart's Creek, 50 of 300 head (G.D.S.); Stewart's Creek, 60 of 200 (J.M.); Mount Beagle, 5 before cattle generally were removed; Mr. Eden, 100 (J.W.L.).

1921.—The occurrence in this year of fatality in cattle arising under the circumstances mentioned has not personally been inquired into, but the following statement in the Press will serve to show the extent to which it has been experienced:—"It can be proved that thousands of head of cattle in this district (north of Roma) alone have died as the result of eating these 'caterpillars.' On the road from Forest Vale to Eddystone Vale, dozens of carcasses can be counted in the timbered country from the roadside, and travellers are hardly clear of the stench from Simpson's Creek to the former station."—Mitchell correspondent in *Queensland Grazier and Farmer*, Brisbane, 4th August, 1921. (*s.v.* "Caterpillar Plague—Mortality in Cattle.")

Note 2.—The special organ used in making provision for the deposition of the eggs and the act of oviposition itself are alike remarkable. Generally speaking, the former consists of two elongated bodies, resembling the five sides of an ovate lanceolate leaf that are folded together enclosing a cavity, acting both as a sheath and director (Plate 45, Fig. 2c), within the latter being enclosed two elongated horny laminæ, each of which has two series of square-ending teeth on one side (Plate 45, Fig. 2d). These laminæ, although closely adjusted side by side, are capable of independent movement, and utilisable as saws, the four organs being packed in a depression between two lips. The mother insect, when about to lay its eggs, settles with its legs astride, with the ovipositor still concealed in the under abdominal surface, and, this done, it grasps firmly the leaf margin between the two labia or lips that enclose it. The saw fly then arches its body, the hinder dorsum of the abdomen being nearly perpendicular. The director, with the saws that it ensheaths, having its longitudinal groove facing anteriorly, then is freed from the groove between the labia, its tip touching the leaf border just in front of where it is clasped. The saws, with their teeth forward, then commence to move rhythmically up and down, issuing in doing so slightly from the groove in the director. Meanwhile they—the director and saws—enter the slit then gradually opened by their agency; the latter then cut rapidly with a few strokes an oblong chamber. This being made of sufficient size, the saws cease their up and down cutting movement and an elongated egg is then passed into the cavity that it nearly fills, the passage of the ovum appearing as the continuous flowing in of a transparent body of soft consistency. The director is then removed; the labia release their hold, the insect moves forward along the leaf edge about the width of their egg-chamber, and here a similar egg-chamber is made and filled after the manner described beyond the one already made. So successive eggs are placed in a band of egg-chambers forming a ribbon along the leaf margin, the edges of the wound in the leaf margin uniting so closely that not only does no death of the injured tissue ensue, but even the normal leaf-colour is scarcely altered.

Note 3.—The following is a more comprehensive description of the saw-fly larva ("caterpillar") than that given on pages 208 and 210:—*The Larva.*—Elongate, semi-oval in section, with the sides of the body erect, this latter, too, curving upwards and broadened towards the head, and sloping downwards, and narrowed gradually, from the fore-segments backwards, being terminated in a gradually compressed awl-shaped tail. The head is roundish, pale-reddish-yellow, minutely and evenly speckled with colour of a darker hue. The body above is glossy, almost smooth, and yellowish-green, and is gemmed with nitid low round boss-like whitish granules. Of these, two transverse rows, about 6 in. each, of rather larger ones with dark centres, occur on the second and third thoracic segments. The smaller granules vary in size; a row of larger compressed ones, one on each segment, extends longitudinally on each side of the middle line. A reddish suffused patch may cross the insect just proximad of the origin of the "tail." The undersurface is plain, showing eight abdominal segments, sides below projecting slightly outwards, the lower margin being festooned with eight rounder lobes. The thoracic segments, with three pairs of legs, each with a 1-jointed short tarsus, ending in a little rounded tuberosity and a piceous coloured claw. Abdominal segments with five pairs of broad pseudo-podia (false legs), terminally wrinkled. Length, 25 cm.

Note 5.—Whilst, at present, some uncertainty exists as to the identity of the tree, regarded locally as the less favoured food-plant of the saw-fly larvæ, and designated "Molly gum," and that some residents of the district speak of it also as "Gum-topped box," it may be mentioned that a second eucalyptus species that the writer has himself observed to be sparingly fed upon by the insects, has, on the evidence of specimens referred to the Government Botanist (C. T. White), been found to correspond to a plant figured in Maiden's "Critical Revision of the Genus Eucalyptus" (Pl. liii., fig. 15A), that the latter regards as a lanceolate leaf form of *E. melanophloia* (its proper host-plant), and that Bentham, who recorded also that it was the gum-topped box of the Suttor River, referred to a form of *Eucalyptus crebra*. It may be added with regard to the Silver Ironbark, and the insects injurious relative thereto, that not only may several of the "grubs" occur upon a single leaf, but they may be generally so numerous as to completely defoliate, within a few days only, the trees on which they occur—often throughout considerable areas.

Note 6.—The fatality in the cattle, consequent on their having eaten the dead saw-fly larvæ (that may occur after rain to the extent of 90 per cent.), accompanied with the living ones (T. Murray), and that would appear to be due to the action of a ptomaine that it is expected would originate in the decay of these insects, may be likened to the similar result that, as has been stated, often follows the gnawing and even consumption on their part of bones, to which decomposed, though dry, meat may still be attached. It, however, has a more close parallel, in certain experiences in Palestine, described by Samsonoff. This investigator has recorded the fact that in the Hedera district, it had been noticed that the hordes of migratory locusts had either filled with their dead bodies the shallow wells in the neighbourhood of the marshes; or had, on dying in the water, caused it to develop a greenish-yellow colour. Also, that cattle and other domestic animals that had been watered at these wells had succumbed after exhibiting grave cerebral symptoms; whilst similar animals, that had drunk the water of wells to which the locusts had not gained access, or that of running streams, had remained unaffected. (*Vide* Samsonoff—"Intoxication des ruminants par les sécretions du criquet pèlerin." *Rec. Méd. Vet.* 1919, Oct. 15, vol, 95. No. 19, pp. 556-565, and Abstract. *Trop. Vet. Bull.*, vol. 8, No. 1, p. 91-2. Mar., 1920.)

Note 7.—W. W. Froggatt, Government Entomologist, N.S. Wales, in a paper, "Notes on Australian Saw-flies (Tenthredinæ) written in 1918 (Proc. Lin. Soc. N.S.W. 43, 3 Oct.) intimates—under *Pterygophorus analis*, G. Costa (*Ann. Mus. Zool*, Napoli, II., p. 66, 1864)—the fact of cases being recorded from the Roma and Mitchell districts; also, of the death of cattle that have been alleged to have acquired the abnormal habit of eating the larvæ of this insect that are described as moribund; and in support of this statement cites a communication from Mr. Moore, of "The Peaks," Marbango, on the subject, and whose experiences relate to 1917 (*Op. cit.*, p. 671-2).

DESCRIPTION OF PLATES.

PLATE I.—1. Male saw fly; 1A. Antenna of male; 2. Female saw fly; 2A. Antenna of female; 2B. External aspect of groove containing ovipositor, labia, &c.; 2C and 2D. Organs forming ovipositor; 2C. Sheath or director, with joint-structure at one end; 2D. The two saws, separated; 3. The egg; 4. Ribbon of egg-cells within tissue of leaf of *Eucalyptus melanophloia* (reduced); 4A. Another view, eggs exposed; 5. Saw-fly larva (so-called "caterpillar"); 6. Larva within cocoon as formed in sandy soil (reduced); 6A. Larva, removed from cocoon prior to pupation. Note, on comparison with 5, stunted form, &c.

[From Drawings by Hubert Jarvis, Entomologist.]

PLATE II.—The larvæ "caterpillars" descending tree trunks prior to entering ground to pupate, or prior to dying without transformation. Photographic representation.

PARASITIC INSECTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report, under date 8th August, 1921, from Mr. Edmund Jarvis, Entomologist:—

INTRODUCTION OF PARASITES.

This matter being considered of importance, preliminary steps have been taken to get into touch with entomologists in those parts of the world where scoliid wasps that might prove serviceable here are known to occur.

Several species of these "Digger-wasps" are obtainable for introduction, and very probably some of them might do valuable work in our canefields.

Before incurring the expense of introducing a parasitic insect, however, the knowledge of certain facts relating to its life-cycle, economy, and environment is essential; as without such information it would be impossible to decide whether a species, if introduced, would, in the first place, be likely to live in Queensland; or, if so, find suitable host grubs, or breed in a normal manner.

With a view to obtaining reliable and comprehensive data of this nature regarding certain species of scoliidæ that appear likely to meet our requirements, I have prepared a list of questions which, when replied to by the various entomologists approached, will considerably illuminate the matter, and enable me in the near future to report more definitely on this interesting form of control.

Bacteriologists who are at present experimenting with different diseases affecting the grubs of cockchafer beetles have also been consulted, and it is hoped that a measure of relief may be secured through the introduction of suitable bacteria, which under our warm climatic conditions should thrive and multiply abundantly.

FUMIGATING CANE BEETLES.

Since the manufacture last year, by Mr. Dawson, of Gordonvale, of a machine for administering carbon bisulphide to the soil, the merits of this fumigant have been rather freely discussed here, and it is proposed to look into the matter this season and conduct a series of field experiments.

Mr. W. F. S. Howe (Manager of Mulgrave Central Mill) happens to have had considerable experience with carbon bisulphide and obtained results against mature cane-grubs which appear conclusive.

I agree with him in thinking that many of the failures in past years resulted from applications having been made either at the wrong time—viz., when the soil was too wet—or in heavy land not properly cultivated.

The best results are usually obtained in well-worked volcanic or clay-loam soils at a time when they are thoroughly moist, but not wet enough to affect porosity. Such conditions generally obtain in light soils about two days after heavy rain, but it is an easy matter to make sure by testing one's land with a spade.

Although carbon bisulphide is much used by entomologists for controlling various soil-frequenting insects, it does not seem to have come into general use here against cane-grubs.

This may be owing to the following reasons:—

1. Its rather high cost.
2. The expense of distributing it by hand-injectors.
3. The difficulty of obtaining reliable men to apply it.
4. The want of knowing exactly *how* and *when* to apply it.
5. Doubts regarding the efficiency, or after effects, of such fumigation.

Now, by adopting some reliable mechanical treatment we at once get rid of objections Nos. 2 and 3, since our field applications would then be performed quickly, systematically, and with certainty, two rows of cane being treated at once by the machine as it passed along between the stools, while the labour involved would consist simply of a driver and one horse.

Seeing that such treatment is not practicable after cane has reached a certain height, fumigation would need to be commenced as soon as possible after flighting of the beetles; for by making an early start we secure a period of two months or more in which to treat young ratoon and late planted crops.

It is proposed, therefore, to direct experimentation during the coming season against the eggs and small grubs, the latter of which will doubtless succumb to ordinary fumigation.

Very little is known regarding the effect of bisulphide on the eggs of scarabacid beetles, but I am inclined to think that the fumes would most likely penetrate the soft and rather absorbent chorion (egg-shell) of Lepidoderma.

However, this is a point to be determined shortly. Our interest at present centres in the machine and its possibilities, which it is to be hoped may be completed this season in time for Mr. Dawson to give a practical demonstration in the field.

If successful, it might pay us to advance another step, and, as suggested by Mr. Howe, manufacture our own carbon bisulphide, and so reduce the cost about one-half, which would satisfactorily dispose of objection No. 1.

Chemistry.

DIPPING FLUIDS.

TABLE A.—POUNDS OF ARSENIC TO BE ADDED TO BRING FLUID IN DIP UP TO STANDARD STRENGTH.

No. of Gallons in Dip	Pounds of Arsenic per 400 Gallons of Fluid found by Analysis.																Deduct for every ½lb. of Arsenic found by Analysis.	Standard Strength at 8 lb.
	Water only 0.	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	lb.	
100	2	1·87	1·75	1·63	1·5	1·38	1·25	1·13	1	0·88	0·75	0·63	0·5	0·38	0·25	0·13	0·06	..
200	4	3·75	3·5	3·25	3·0	2·75	2·5	2·25	2	1·75	1·5	1·25	1·0	0·75	0·5	0·25	0·12	..
300	6	5·63	5·25	4·88	4·5	4·13	3·75	3·38	3	2·63	2·25	1·88	1·5	1·13	0·75	0·38	0·19	..
400	8	7·5	7·0	6·5	6·0	5·5	5·0	4·5	4	3·5	3·0	2·5	2·0	1·5	1·0	0·5	0·25	..
500	10	9·38	8·75	8·13	7·5	6·88	6·25	5·63	5	4·38	3·75	3·13	2·5	1·88	1·25	0·63	0·31	..
600	12	11·25	10·5	9·75	9·0	8·25	7·5	6·75	6	5·25	4·5	3·75	3·0	2·25	1·50	0·75	0·38	..
700	14	13·12	12·25	11·37	10·5	9·63	8·75	7·88	7	6·13	5·25	4·38	3·5	2·63	1·75	0·88	0·44	..
800	16	16·0	14·0	13·0	12·0	11·0	10·0	9·0	8	7·0	6·0	5·0	4·0	3·0	2·0	1·0	0·50	..
900	18	16·87	15·75	14·62	13·5	12·38	11·25	10·13	9	7·88	6·75	5·63	4·5	3·38	2·25	1·13	0·56	..
1,000	20	18·75	17·5	16·25	15·0	13·75	12·5	11·25	10	8·75	7·50	6·25	5·0	3·75	2·5	1·25	0·63	..
1,200	24	22·5	21·0	19·50	18·0	16·5	15·0	13·5	12	10·5	9·0	7·5	6·0	4·5	3·0	1·5	0·75	..
1,600	32	30·0	28·0	26·0	24·0	22·0	20·0	18·0	16	14·0	12·0	10·0	8·0	6·0	4·0	2·0	1·0	..
2,000	40	37·5	35·0	32·5	30·0	27·5	25·0	22·5	20	17·5	15·0	12·5	10·0	7·5	5·0	2·5	1·25	..
2,400	48	45·0	42·0	39·0	36·0	33·0	30·0	27·0	24	21·0	18·0	15·0	12·0	9·0	6·0	3·0	1·50	..
2,800	56	52·5	49·0	45·5	42·0	38·5	35·0	31·5	28	4·5	21·0	17·5	14·0	10·5	7·0	3·5	1·75	..
3,000	60	56·25	52·5	48·75	45·0	41·25	37·5	33·75	30	26·25	22·5	18·75	15·0	11·25	7·5	3·75	1·88	..
3·200	64	60·0	56·0	50·0	48·0	44·0	40·0	36·0	32	28·0	24·0	20·0	16·0	12·0	8·0	4·0	2·0	..
3,600	72	67·5	63·0	58·5	54·0	49·5	45·0	41·5	36	31·5	27·0	22·5	18·0	13·5	9·0	4·5	2·25	..
4,000	80	75·0	70·0	65·0	60·0	55·0	50·0	45·0	40	35·0	30·0	25·0	20·0	15·0	10·0	5·0	2·5	..
5,000	100	93·75	87·5	81·25	75·0	68·75	62·5	56·25	50	43·75	37·5	31·25	25·0	18·75	12·5	6·25	3·12	..
6,000	120	112·5	105·0	97·5	90·0	82·5	75·0	67·5	60	52·5	45·0	37·5	30·0	22·5	15·0	7·5	3 75	..
	..	..	..	..	Water 0	½	1	1½	2	2½	3	3½	4	4½	5	5½	..	6 lb.
	..	..	Water 0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	..	7 lb.

Pounds of Arsenic per 400 gallons of fluid, by analysis,

TABLE B.

GALLONS (AND PINTS) OF LIQUID CONCENTRATES, OR POUNDS OF POWDER CONCENTRATES TO BE ADDED TO FLUID IN DIP, ACCORDING TO POUNDS OF ARSENIC FOUND FROM TABLE A.

Pounds of Arsenic to be added to fluid in Dip.	LIQUID CONCENTRATES.					POWDER CONCENTRATES.	
	1÷100	1÷125	1÷140	1÷160	1÷200	1÷200	1÷250
	Gals. pts.	Gals. pts.	Gals. pts.	Gals. pts.	Gals. pts.	Lb.	Lb.
1	0 4	0 3	0 3	0 2½	0 2	2½	2
2	1 0	0 6	0 6	0 5	0 4	5	4
3	1 4	1 1½	1 0½	0 7½	0 6	7½	6
4	2 0	1 5	1 3½	1 2	1 0	10	8
5	2 4	2 0	1 6	1 4½	1 2	12½	10
6	3 0	2 3	2 1	1 7	1 4	15	12
7	3 4	2 6½	2 4	2 1½	1 6	17½	14
8	4 0	3 1½	2 7	2 4	2 0	20	16
9	4 4	3 5	3 1½	2 6½	2 2	22½	18
10	5 0	4 0	3 4½	3 1	2 4	25	20
11	5 4	4 3	3 7½	3 3½	2 6	27½	22
12	6 0	4 6½	4 2	3 6	3 0	30	24
13	6 4	5 1½	4 5	4 0½	3 2	32½	26
14	7 0	5 5	5 0	4 3	3 4	35	28
15	7 4	6 0	5 3	4 5½	3 6	37½	30
16	8 0	6 3	5 5½	5 0	4 0	40	32
17	8 4	6 6½	6 0½	5 2½	4 2	42½	34
18	9 0	7 1½	6 3½	5 5	4 4	45	36
19	9 4	7 5	6 6	5 7½	4 6	47½	38
20	10 0	8 0	7 1	6 2	5 0	50	40
21	10 4	8 3	7 4	6 4½	5 2	52½	42
22	11 0	8 6½	7 7	6 7	5 4	55	44
23	11 4	9 1½	8 1½	7 1½	5 6	57½	46
24	12 0	9 5	8 4½	7 4	6 0	60	48
25	12 4	10 0	8 7½	7 6½	6 2	62½	50
26	13 0	10 3	9 2	8 1	6 4	65	52
27	13 4	10 6½	9 5	8 3½	6 6	67½	54
28	14 0	11 1½	10 0	8 6	7 0	70	56
29	14 4	11 5	10 3	9 0½	7 2	72½	58
30	15 0	12 0	10 5½	9 3	7 4	75	60
40	20 0	16 0	14 2	12 4	10 0	100	80
50	25 0	20 0	17 6½	15 5	12 4	125	100

TABLE C.—GALLONS (AND PINTS) OF CONCENTRATE TO BE ADDED TO BRING FLUID IN DIP UP TO STANDARD STRENGTH.

For Queensland Royal Dip. Dip No. 2 Australian Dip. 1 ÷ 160.	Pounds of Arsenic per 400 Gallons of Fluid found by Analysis.																				Deduct for every ¼-lb. of Arsenic found by Analysis.	Standard Strength per 400 Gallons.
	0 Water	¼	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½						8 lb.
Gallons of Fluid in Dip.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.	gls. pts.					gls. pts.	
100	0 5	0 5	0 4½	0 4½	0 4	0 4	0 3½	0 3	0 2½	0 2½	0 2	0 2	0 1½	0 1	0 0½	0 0½					0 0½	..
200	1 2	1 1½	1 0½	1 0	0 7½	0 7	0 6½	0 6	0 5	0 4½	0 4	0 3½	0 2½	0 2	0 1½	0 0½					0 0½	..
300	1 7	1 6	1 5	1 4½	1 3½	1 2½	1 1½	1 0½	0 7½	0 7	0 6	0 5	0 4	0 3	0 2	0 1					0 0½	..
400	2 4	2 2½	2 1	2 0	1 7	1 6	1 4½	1 3½	1 2	1 1	0 7½	0 6½	0 5	0 4	0 2½	0 1½					0 0¾	..
500	3 1	3 0½	2 7½	2 5	2 2½	2 1	1 7½	1 6	1 4½	1 3	1 1½	1 0	0 6½	0 5	0 3½	0 2					0 1	..
600	3 6	3 4½	3 2½	3 0½	2 6½	2 5	2 3	2 1	1 7	1 5	1 3	1 1½	0 7½	0 6	0 4	0 2					0 1	..
700	4 3	4 1	3 6½	3 4½	3 2½	3 0½	2 6	2 4	2 1½	1 7½	1 5	1 3	1 1	0 7	0 4½	0 2½					0 1¼	..
800	5 0	4 5½	4 3	4 0½	3 6	3 3½	3 1	2 6½	2 4	2 1½	1 7	1 4½	1 2	0 7½	0 5	0 2½					0 1½	..
900	5 5	5 2½	4 7½	4 5	4 2	3 7	3 4	3 1½	2 6½	2 4	2 1	1 6	1 3½	1 0½	0 6	0 3					0 1½	..
1,000	6 1	5 6	5 3	5 0½	4 5½	4 3	4 0	3 4½	3 1	2 6	2 3	2 0	1 4½	1 1½	0 6½	0 3½					0 1¾	..
1,200	7 4	6 9½	6 4½	6 1	5 5	5 1½	4 5½	4 2	3 6	3 2½	2 6½	2 3	1 7	1 3½	0 7½	0 4					0 2	..
1,600	10 0	9 3	8 6	8 1	7 4	6 7	6 2	5 5	5 0	4 4	3 6	3 1	2 4	1 7	1 2	0 5					0 2½	..
2,000	12 4	11 6	10 7½	10 1½	9 3	8 5	7 6½	7 0½	6 2	5 4	4 5½	3 7½	3 1	2 3	1 4½	0 6½					0 3¼	..
2,400	15 0	14 0½	13 1	12 1½	11 2	10 2½	9 3	8 3½	7 4	6 4½	5 5	4 5½	3 6	2 6½	1 7	0 7½					0 3¾	..
2,800	17 4	16 3½	15 2½	14 2	13 1	12 0½	10 7½	9 7	8 6	7 5½	6 4½	5 4	4 3	3 2½	2 1½	1 1					0 4	..
3,000	18 7	17 5½	16 4	15 2½	14 0½	12 7½	11 6	10 4½	9 3	8 2	7 0½	5 6	4 5½	3 4	2 2½	1 1½					0 4½	..
3,200	20 0	18 6	17 4	16 2	15 0	13 6	12 4	11 2	10 0	8 6	7 4	6 2	5 0	3 6	2 4	1 2					0 5	..
3,600	22 4	21 1	19 5½	18 2½	16 7	15 4	14 0½	12 5½	11 2	9 3	8 3½	7 0½	5 5	4 2	2 6½	1 3½					0 5¾	..
4,000	25 0	23 3½	21 7	20 2½	18 6	17 2	15 6	14 1	12 4	10 5½	9 3	7 6½	6 2	4 5½	3 1	1 4½					0 6¼	..
5,000	31 2	29 2½	27 3	25 3½	23 3½	21 4	19 4	17 4½	15 5	13 5½	11 6	9 6½	7 6½	5 7	3 7½	2 0					1 0	..
6,000	37 3	35 0½	32 6	30 3½	28 1	25 6½	23 4	21 1	18 6	16 3½	14 1	11 6	9 3	7 0½	4 6	2 3					1 1½	..
	..	..	..	..	Water 0	½	1	1½	2	2½	3	3½	4	4½	5	5½					..	6 lb.
	..	..	Water 0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½					..	7 lb.

INSTRUCTIONS FOR USE OF TABLES.

To find the amount of concentrate to be added to the fluid in a dip, ascertain first from Table A the necessary amount of arsenic in lbs., according to the strength of the fluid found by analysis. For instance, if the dip contains 2,800 gallons of fluid, and the analysis showed 5½ lb. of arsenic per 400 gallons, we find that 17.5 lb., or nearly 18 lb., of arsenic must be added to bring the fluid up to the standard strength of 8 lb. per 400 gallons. Should a dip owner wish to use a dip of lesser strength on account of dipping at regular shorter intervals, or during very hot weather, the figures at the bottom of the table may be used, and for an adopted standard strength of 7 lb. for above example only 10.5 lb. of arsenic should be added, and for 6 lb. standard strength only 3.5 lb.

Should the analysis show 5¾ lb. instead of 5½ lb., a slight reduction for the ¼ lb. may be made, using the figures in the last column of the table, this deduction amounting for 2,800 gallons to 1.75 lb., so that 17.5 lb. — 1.75 lb. = 15.75 lb., or 16 lb. of arsenic would have to be added to the fluid in the dip.

If a dip is to be recharged after cleaning out, the amount of arsenic necessary to be added is found by using the column for water (0). A dip of, say, 2,600 gallon capacity would require 48 lb. for 2,400 gallons and additional 4 lb. for 200 gallons, or a total of 52 lb. of arsenic.

To find now the gallons of concentrate or lbs. of powder concentrate, use Table B, and we find that 17.5 lb. or 18 lb. of arsenic is supplied by—

7 gallons 1½ pints of Cooper's Dip (1 ÷ 125).
5 gallons 5 pints of Queensland dip, or Royal No. 2 (1 ÷ 160), and
45 lb. of Vallo Powder Dip (1 ÷ 200).

Table C can be used to find the gallons of concentrate, of a strength of 1 ÷ 160, which is the strength of the majority of concentrates, necessary to be added, directly from the number of gallons of fluid in dip, and the analysis, similar to Table A, without the use of a second Table B.

J. C. BRÜNNICH, Agricultural Chemist.

Editorial Notes.

A Warning to Fruit-growers and Others.

From time to time advertisements appear in the public Press extolling the qualities of certain plants or fruits being offered for sale, usually at fancy prices, and some farmers, in consequence of these glowing accounts, are induced to make unwise purchases. Extraordinary and extravagant statements are frequently made which, from their very nature, to say the least, are gross exaggerations; yet, such is the credibility of uninformed human nature, that many people believe them and pay high prices for goods sold under attractive and misleading labels that may be purchased under their right names at a fraction of the cost of the camouflaged article. Again and again so-called novelties, more or less worthless, and which have already been thoroughly exploited, are advertised and find ready acceptance. Southern publications devoted to fruit culture have recently called attention to this phase of get-rich-quick business, and have instanced two cases. The first is that of the so-called "carringberry," which has been given an impossible pedigree, and for which fabulous yields are claimed. This wonderful plant turned out to be nothing else than the well-known loganberry, which had its known origin on the property of Judge Logan at Santa Cruz, California, and of which a specimen was growing at the University Gardens, Berkeley, California, prior to 1890. So the "carringberry" is anything but a new discovery. The other plant referred to is the so-called

"Mexican" passion fruit, which, according to Southern authorities, is none other than an overgrown variety of the common passion fruit. This fruit is known in Queensland as the "giant passion fruit," but a totally different fruit is understood when the term "Mexican" is applied here, as the fruit so designated is that of the plant known as *Tacsonia mollisima*, which is closely related to the genus passiflora, and belongs to the same natural order. It is sometimes known as the "banana passion fruit," and has been grown to a limited extent in Australia for a number of years, but practical orchardists have never seriously entered upon its cultivation. Many other instances of much over-rated fruits and plants may be cited, but these two are sufficient to stress the necessity of the continuance of caution on the part of men on the land in respect to invitations to purchase goods for which extravagant claims are made. No really genuine article requires excessive advertisement. It sells on its merits; hence growers and others interested would be well advised to accept with caution accounts of plants advertised as something not merely of superior quality but of superlatively profit-producing possibilities. Recognised Australian nurserymen are fully alive to this sort of exploitation, and are able to give reliable information respecting any much-boomed plant or fruit. It will be found that, more than likely, they have already tested it and are able to say whether it is worth growing or not.

* * * * * * * *

To Cotton-growers. As the end of this year's cotton-ginning operations is in sight, this Department cannot receive seed cotton later than 20th September. Every bag should be branded with sender's initials and a letter of advice posted as soon as the consignment has been placed on rail.

* * * * * * * *

Tractor Ploughing. The time and labour saving possibilities of tractor ploughing were demonstrated at Mr. F. A. Stimpson's dairy farm near Dutton Park on 15th August in the presence of a large gathering of farmers and others interested in agriculture. The tractor is of the caterpillar type, and has the appearance of an adaptation of the small high-speed whippet tanks which were used during the last stages of the war. It did its work in heavy soil wonderfully well, trailing two ploughs—a treble furrow and double furrow mould-board, each with rolling coulters. The condition of the field operated on was not quite favourable, being in parts wet and sticky, and the going was, consequently, very heavy. The test was therefore fairly severe, but the tractor surmounted every difficulty with ease. The work was done on second speed, something over 2 miles an hour, and the five furrows were cut each a foot wide and about 8 inches deep. An additional factor adding to the severity of the task was that the land had not hitherto been so deeply ploughed. Every one present was impressed with the efficiency and economy of the machine. Handling was reduced to a minimum. Once the engine had been cranked, the entire operation was controlled from the driver's seat, proving it to be entirely a one-man job. The tractor moved on a 13-inch "tread," and made a light impression even on soft land, and there was no evidence of its packing the soil. The demonstration generally was highly successful.

* * * * * * * *

The Cassaba Melon. The notification in the August Journal that a small quantity of seed of the cassaba melon was available for distribution at this Office brought many hundreds of applications from all parts of Queensland, and quite a number from the Southern States. The supply at our disposal was very limited, consequently the number of seeds for distribution to each applicant had to be reduced to three. A number of requests reached us after our supply had been exhausted, and in order that each may be met, efforts are being made to obtain a further supply from an outside source. So far as possible, every request will be complied with. The seeds should be sown in September in accordance with the general directions given in our last issue.

* * * * * * * *

Dehydration. The section of a dehydrator shown in full working order at the Brisbane Exhibition became the focal point of great public interest. In the course of the week of operation quantities of pines, bananas, papaws, cocoanuts, and several varieties of vegetables were successfully treated. The plant, which forms a unit of a complete 8-section dehydrator to be erected at Beerburrum in time to treat the coming season's crop, is now being transferred to that centre.

General Notes.

"THE PURE SEEDS ACT OF 1913" AS AMENDED BY "THE PURE SEEDS ACT AMENDMENT ACT OF 1914."

The abovementioned Acts, are intended to regulate the sale of seeds for planting or sowing—that is to say, all vendors of seeds must comply with the Acts and Regulations thereunder.

VENDOR.

A vendor within the meaning of the Act is—

"Any person who sells, or offers or exposes for sale, or contracts or agrees to sell or deliver any seeds."

It will, therefore, be noted that the common acceptance of the Acts as referring only to seedsmen is erroneous. A produce merchant, storekeeper, auctioneer, farmer, or grower of the seed are vendors under the Acts whenever they sell, offer, expose for sale, contract or agree to sell any seeds for sowing.

INVOICE MUST BE GIVEN BY VENDOR.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

"The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds."

FOREIGN INGREDIENTS.

Foreign ingredients include dead and non-germinable seeds, diseased or insect-infested seeds, weed seeds, or seeds of any cultivated plant other than that to which the sample purports to belong. Also inert matter, which includes chaff, dust, stones, or any material other than seeds, and broken seeds less in size than one-half of a complete seed.

The proportion or amount of foreign ingredients that may be contained in any seeds is prescribed by the Regulations, copies of which may be obtained from the Government Printer, William street, Brisbane, for 4d. post free.

B GRADE SEEDS.

Seeds in which the amount of foreign ingredients exceeds the proportion set forth in Schedule A of the Regulations, but does not exceed the proportion set forth in Schedule B, may be sold as seeds for sowing, providing they are contained in bags or packages to each of which is affixed a label, brand, or stamp, clearly and indelibly marked, specifying: The kind or kinds of such seeds; that the seeds are B grade, for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed; the name and address of vendor. All invoices relating to such seeds must be distinctly marked "B Grade Seeds."

SAMPLES FOR EXAMINATION.

In order to ascertain if seeds comply with the Acts, samples may be submitted for examination.

The weight of such samples must not be less than the amount prescribed by the Regulations, which are as follows:—

WEIGHT OF SAMPLE TO MAIL.

Wheat, oats, barley, maize, rice, rye, peas, cowpeas, beans, tares	8 oz.
Millet, sorghum, sudan grass, panicum, buckwheat, lucerne, clover, linseed, prairie	4 oz.
Rhodes, paspalum	2 oz.
Turnip, cabbage, parsnip, carrot, and vegetable seeds of like size	½ oz.
All seeds other than those included above	2 oz.
Vegetable seeds in make-up packets	3 packets.

In the case of samples containing a large amount of foreign ingredients, it is advisable to send double the weight mentioned.

When drawing a sample care should be taken to obtain a quantity from the top, bottom, and middle of each bag. These should be thoroughly mixed to ensure the sample being uniform.

Every sample sent should have the following particulars plainly written thereon:—

Name of seed.
Quantity that the sample represents.
Name and full address of sender.

If the result of the examination is required for purposes of sale, a fee of 2s. 6d. per sample will be charged.

No charge will be made to farmers sending in samples of seed which they have purchased as seed for sowing, providing the following particulars are given:—

Vendor's name and address.
Name of seed.
Quantity purchased.
Date of delivery.
Locality where seed is to be sown.
Name and address of purchaser.

Samples, with covering letter, should be addressed to—

UNDER SECRETARY,
DEPARTMENT OF AGRICULTURE AND STOCK,
BRISBANE.

August, 1921.

PUBLICATIONS RECEIVED.

The Journal of the Ministry for Agriculture (United Kingdom) for July contains Professor R. C. Punnett's (University of Cambridge) concluding article on "Research in Animal Breeding." The tangle of sex and its dependent characters are illuminatingly set out. "One of the most striking points of difference between the higher animals and plants is that in the former the sexes are separate, while the latter are most often hermaphrodite," is the writer's opening observation, and he goes on to deal with further points of Mendelian inheritance. The whole series of articles comprise a very valuable contribution on sex heredity. Other informative contributions are: "The Dairy Shorthorn," "Grading and Packing of Fruit," "Mosaic Disease of Potatoes," "Liming," "Potato Trials, 1920," and "The 1920 Lincoln Tractor Trials."

The International Review of the Science and Practice of Agriculture (Rome) for May is made up of many valuable abstracts from the world's agricultural Press, chief among which are notes on rural hygiene, tillage and methods of cultivation, an account of how the drought problem is dealt with in Brazil, and notes on agricultural chemistry, live stock and breeding, farm engineering, rural economics, plant diseases, and entomology.

The Agricultural Gazette of Canada (May—June) has listed among its leading topics—"Fighting the Grasshopper," "Co-operative Marketing of Fruits and Vegetables in British Columbia," "Restoration of the Apple Orchard to Pre-War Productiveness," and "Prevention of Loss in the Shipment of Fruit and Vegetables."

La Revista Agricola (Mexico) for June is particularly interesting to horticulturists. It contains a fine article on rosegrowing, in addition to much other informative contributions of general interest to the tropical agriculturist.

The *Bulletin of the Department of Agriculture, Trinidad and Tobago* (Trinidad), 1921, Part 2, vol. XIX., has among its leading topics an account of sugar-cane experiments, 1918-20, by Joseph de Verteuil, F.I.C., F.C.S., Superintendent of Field Experiments, Trinidad.

The Journal of Heredity (U.S.A.), vol. XII., No. 2, February, 1921, covers a wide area in its chosen fields of plant-breeding, animal-breeding, and eugenics. Included in its original matter are articles entitled "Inheritance in Swine," "Heritable Characteristics of Maize," "Inbreeding and Cross-breeding," and "Polydactylism in Cattle."

The Journal of Dairy Science (U.S.A.) for May features the following:—"The Influence of Calcium and Phosphorus in the Feed on the Milk Yield of Dairy Cows," "Official Grading and Control of Dairy Produce for Export," and "Historical Notes on Cotton Seed as Food."

The Indian Forest Records (Calcutta), Vol. VIII., Part II., by R. S. Hole, C.I.E., F.C.H. (Botanist, Forest Research Institute, Dehra Dun) is a well-illustrated production covering an account of "The Regeneration of Sal (*Shorea robusta*) Forests—A Study in Economic Œcology," and is replete with valuable information on the results of some forestry experiments in India.

The Agricultural Journal of India (May) features among its original articles notes on "Improved Field for Agricultural Investigations," by S. Milligan, M.A., B.Sc., Agricultural Adviser to the Government of India. Other notable contributions include "Cambodia Cotton (*Gossypium hirsutum*)—Its Deterioration and Improvement," by G. R. Hilson, B.Sc.

The *International Review of Agricultural Economics* (Rome) for April has an account of the agricultural co-operative movement in Germany in 1918-19, a review of the organisation of co-operative grain elevation companies in the United States, and contains, besides, much miscellaneous information relating to co-operation in Algeria, Egypt, France, Great Britain and Ireland, and Holland, and economic and social conditions of agricultural classes in European countries.

The Rhodesia Agricultural Journal (June) covers a notable memorandum on the cattle industry in Southern Rhodesia.

The New Zealand Journal of Agriculture (July) has among its main features an article on the abortion disease of cattle, by H. A. Reid, D.V.H., F.R.C.V.S., Veterinary Laboratory, Wallaceville. Other contributions include "The Introduction into New Zealand of *Aphelinus mali*, a valuable parasite of the woolly aphis," by R. J. Tillyard, M.A., D.Sc., Entomologist and Chief of the Biological Department, Cawthron Institute of Scientific Research, Nelson; "Commercial Potato-growing" by H. E. McGowan, and "Standard Fruit Grading and Packing," by J. A. Campbell, Director of Horticulture.

The Journal of the Department of Agriculture of South Australia (July) continues an account of some feeding tests with pigs. Other informative feaures are notes on agricultural experiments and downy mildew in South Australian vineyards.

The Journal of the Department of Agriculture, Union of South Africa (July) has among its principal contents "Motor Tractors," "Spineless Cactus as a Fodder for Stock," "Pest Remedies—Insecticides and Fungicides," and "Moisture in Maize."

The Agricultural Gazette of New South Wales (August) has amongst a mass of general information a concluding article on "The Feeding of Sheep in Times of Drought," an article on "Co-operation for Farmers" (C. C. Crane, B.A.), a further contribution on "Producing Lucerne Hay under Irrigation Conditions—Methods and Experiences at Yanco Experiment Farm" (F. G. Chomley and F. Chaffey), and a report of "Some Germination Tests of Prickly-pear Seeds (E. Breakwell, B.A., B.Sc.).

OCTOBER SHOW DATES.

Toombul A.H. and I. Association: 30th September and 1st October.

Mount Larcom, *via* Gladstone: Wilmott Farmers' P. Association: 8th October.

Ravenshoe F.G. and P. Association: 12th and 13th October.

Innisfail, Johnstone River, A. Society: 14th and 15th October.

Malanda.—Millaa Millaa Settlers' P. Association: 19th and 20th October; and Eacham P.A.I. Society: 19th and 20th October.

Answers to Correspondents.

SILVER FISH (LEPISMA).

C. G. Y., Wowan—

Your application for direction as to measures for controlling Silver Fish in the house was submitted to Mr. Henry Tryon, Government Entomologist, who advises as follows:—

"These insects are very difficult to cope with, owing to the fact they have no resting period—being ones that undergo no metamorphosis, and to their obscure habits; again, since they can subsist long without food or that contained in dust and their cast skins only.

"Their most favoured aliment is starch and sugar, and glazes made of the former substance, and used for dressing silk or cotton fabrics or various forms of cardboard or papers. An incorporation of arsenic in the bodies of this nature, where its

presence is not otherwise forbidden, will both serve to protect them and kill these domestic pests.

"As a rule, exposure and thorough airing of articles amongst which they resort serves temporarily to banish them, especially if receptacles that have contained these receive at the same time a thorough brushing out.

"Pyrethrum powder (Insectibane) dusted in places that are harbours for them again serves to repel them; so also crushed "mothballs" (naphthaline). Boracic acid applied in the same manner may be useful for the purpose, too, but I have no evidence that this is so.

"Further, one can dip pieces of cardboard or strong paper in a sweetened flour-paste containing a trace of arsenic, or 'white ant cure,' and when the latter has dried upon them, place these pieces in crannies resorted to by silver fish, and so many may be destroyed. In putting linen and cotton articles away for a period, it is as well—if this be admissible—to wash whatever starch they may contain from them before doing so. This especially applies to delicate fabrics such as muslins."

PISE HOUSES.

J. RICE (Springfield, Townsville).—The Surveyor, Department of Agriculture and Stock (Mr. Arthur Morry), to whom your request for information was referred, replies as follows:—

"1. Pisé walls will resist cyclonic storms admirably. The roof would require some special attention on account of the overhang, which is primarily intended to protect the walls against wet weather. Cyclonic storms may get under the eaves, but if the projecting ceiling joints are carefully anchored down by ironbark posts, as suggested by correspondent, no harm would be likely to arise. Low or flat roofs are a good protection against cyclones.

"2. A house constructed as per plan in the situation named would have a good residential value, as it would be a permanent structure, and subject to very little depreciation, but for removal purposes its value would be limited to fittings, fixtures, and material, which could be used again.

"3. Suggest you write to Manager, State Advances Corporation, Brisbane, in connection with this question.

"4. Ant bed could be used for pisé buildings if treated properly, but it is a question not yet determined as to whether its superiority is so much in excess of normal pisé material as to justify the extra labour involved in its preparation. Formic acid is the ingredient which makes ant bed so hard. No machine of the kind mentioned by the correspondent for reducing ant bed is known, and it is questionable whether results would justify the expense. Ant bed can be worked up into a paste with water and plenty of puddling, when grinding would be unnecessary."

THE CULTIVATION OF THE DATE PALM.

JOHN MCNULTY (Thursday Island).—Your request for information on the cultivation of the date palm was submitted to the Director of Fruit Culture (Mr. Albert H. Benson, M.R.A.C.) who advises as follows:—

"This palm requires to be grown in a deep sandy soil, in a hot, dry climate. Water for irrigation must be available. The natural habitat of the date palm are the oases of Northern Africa and of the Persian Gulf, where there is great heat to ripen the fruit, and sufficient moisture in the soil to grow the palm to perfection. The only districts in Queensland in which the date is capable of being grown commercially are our dry inland regions, where there is little or *no frost* but great heat, sandy soil, and water for irrigation. The date will not stand an excess of salt; it is therefore doubtful if it would thrive on the western side of the Cape York Peninsula on the soils mentioned, even though the climate were favourable."

PINEAPPLE FERTILISER.

A. MCC. (Lissonagh, Kuraby).—Superphosphate must on no account be used for pineapples. A formula approved by Mr. A. H. Benson, Director of Fruit Culture, and which is producing very good results at Beerburrum, is—

Dried blood	400 lb.
Sulphate of potash	200 lb.
Holborne Island phosphates	150 lb.
Total	750 lb.

TO EXTIRPATE SCOTCH THISTLE (CARDUUS LANCEOLATA).

A.G.N. (Scrubby Creek, Howard).—If infestation is heavy, we would suggest mowing before the thistles reach maturity, and stacking for ensilage. When so conserved they possess valuable nutritive qualities, Spraying with poison is expensive and highly dangerous to stock, particularly horses, which at certain periods of growth are very fond of Scotch thistles. Where paddocks are entirely overrun with thistles they become in time "thistle sick." Instances of this are frequent, and paddocks almost impassable from this cause become, as a consequence, entirely free.

MIXED FARMING.

"CLOUGH EAST" (Murgon).—Recommend concentration of energies on improvement of stock, and conservation of fodder in the form of ensilage and so on. Rotation crops you will find will be better paying propositions in your district, as adjuncts to dairying, than from a cereal-production point of view. We are in this instance referring to wheat, oats, and barley being used in rotation with lucerne. Maize, of course, is another matter, and can be grown as a commercial side line. This Department will be pleased to co-operate with you in experimental work in grain, sorghum, and other crops, and you are advised to get in touch with the Director of Agriculture, intimating your willingness to take up this class of work, for which you will be compensated.

Stock at State Farms for disposal:—State Farm, Warren—Ayrshire cattle and Berkshire pigs. Queensland Agricultural College, Gatton.—*Cattle*—Ayrshires, Guernseys, Jerseys, Friesians. *Horses*—Clydesdales. *Pigs*—Berks and Yorks. Kairi State Farm.—*Cattle*—Illawarra, M.S., Jerseys. *Pigs*—Berks. Gindie State Farm.—*Cattle*—Beef Shorthorns. *Horses*—Suffolk Punch.

FOR POISONING TREES.

A.H.K. (Wilsonton, Toowoomba).—Formula—

Arsenic	1 lb.
Caustic soda	2 lb.
or	
Washing soda	3 lb.
Water	4 gals.
Whiting	½ lb.

Method.—Mix the arsenic into a paste with water. By diluting a little and mixing with caustic soda great heat is generated, and the arsenic becomes dissolved. Additional water should be added to make up the required 4 gallons. When using washing soda, proceed as before, and add gradually to soda solution, boiling for at least an hour until arsenic is dissolved. Keep the whole solution well stirred. The arsenical fumes being dangerous, care must be taken to avoid inhalation during the boiling process. The whiting is used for the purpose of showing up by means of its colour areas treated. This poison should be poured into a frill cut into the bark and encircling the tree.

CATERPILLARS IN LUCERNE.

In lucerne affected by the larvæ, cut the crop, when most of the cocoons are formed (this is indicated by the leaves curling) and stack either in the form of ensilage or allow it to reach the stage when it will make sweated hay. The temperature so caused is sufficient to kill the grub, and the value of the hay as fodder is not detrimentally affected. As soon as the crop is removed, the paddock should be well rolled and cross rolled. Harrowing during frosty weather would be beneficial, having a tendency to bring to the surface and expose any larvæ that may be perdu.

PIT SILOS.

E.A.T. (Humberton, Roma).—It is not advisable to slope the sides of a pit silo, as in so doing the settlement of the material pitted is necessarily impeded. The less friction set up in the process of settlement the less air will be admitted, and consequently better ensilage will result, fermentation thereby being prevented. Under any circumstances the sides of all pit silos should be lined with wood, brick, or concrete (preferably the last), and the pit made impervious to water.

MOTOR PLOUGHS.

H.T.M. (Burnham Farm, Woombye).—Several makes of the class of motor plough to which you refer have lately appeared on the American market, but no further particulars have been received of the plough referred to.

The Markets.

THE FRUIT TRADE.

Returns of Exports and Imports for the month of July, 1921, for Brisbane only:—

EXPORTS BY RAIL, VIA WALLANGARRA, TO SYDNEY AND MELBOURNE.

TO SYDNEY—

10,773 cases bananas
47 cases oranges
8,083 cases pineapples
606 packages vegetables
517 cases mixed fruits
1,718 trays strawberries

TO MELBOURNE—

28,353 cases bananas
1,006 cases oranges
7,278 cases pineapples
124 cases mixed fruit

EXPORTS BY SEA.

TO SYDNEY—

749 cases bananas
5,877 cases pineapples
329 bags sweet potatoes
350 bags pumpkins
260 cases fruit pulp
4,049 cases canned pineapples
1,213 bags barley
950 bags vegetables

TO MELBOURNE—

926 cases bananas
3,503 cases pineapples
638 cases oranges
70 cases vegetables
88 cases mixed fruits

IMPORTS.

BY SEA—

25,582 cases fruit
8,012 bags potatoes
4,718 bags onions
110 packages plants

BY RAIL—

6,773 cases of fruit
5,993 bags potatoes
217 packages plants

PRODUCTION, PROSPECTS, AND PRICES.

The following market survey is an abridgment of departmental summaries of conditions, prospects, and prices for the month ended 20th August, 1921:—

AGRICULTURE.

The heavy July rains were in many places followed by floods, more or less serious. A period of low temperatures accompanied by heavy westerlies ensued. Frosts were badly needed, particularly in the fruit and wheat areas.

THE MARKETS.

Lucerne Chaff.—Commencing with a poor demand, conditions improved as the first week of the period under review advanced. Sales were effected from 6s. to 8s. 6d., but many lines were passed in at 6s. 3d. to 6s. 6d.

Oaten Chaff.—A fair demand existed for lines from over the Border, but local lines were lifeless. Border supplies sold to 8s. 9d. for prime. Sales of local chaff ranged from 3s. 7d. to 5s.

Mixed Chaff.—Supplies fairly plentiful, but demand weak. Sales were made at 3s., 5s. 4d., 6s. 7d., and 7s. per cwt., whilst many lines were passed in at 4s. 6d., 5s., and 6s. per cwt

Maize.—Supplies were light at the beginning of the first week, but increased later; 4s. 3d. to 4s. 5d. was the range, but many consignments were passed in at 4s. 4d. to 4s. 4½d.

Wheat.—Good feed lines sold to 7s., with inferior grain down to 4s. 3d.

Potatoes.—The demand for good tubers improved, and sales were made at 5s. 9d. to 8s. 3d. per cwt. Many parcels were withheld, business being refused at 4s. 6d. to 6s. 9d.

Sweet Potatoes.—Very few lots came forward. Prime quitted at 3s. 2d. per cwt., and inferior changed hands at 2s. 6d.

Pumpkins.—Demand light. Sales were made at 2s. 3d. to 2s. 9d. Many lines were passed in at 2s., 2s. 3d., and 2s. 6d. per cwt.

Barley.—Only one line was submitted and passed in at 3s.

Broom Millet.—Unchanged. Prime hurl brought £28. Other qualities down to £21 per ton.

In the middle of August the weather was unseasonable, bleak winds being followed by heavy frosts, causing some damage. This, however, was balanced by a check to insect life. Wheat prospects were good. Generally speaking, the agricultural and pastoral outlook in Queensland for the next few months at least is distinctly favourable. Supplies of all classes decreased, and prices rose a little as the result of a dearth of prime lines.

MID-MONTH PRICES.

Lucerne Chaff.—Supplies fair, quality a little inferior. Tht top price was 7s. 11d.; other lines quitted at from 4s. 6d.

Mixed Chaff.—Dull; 4s. 6d. to 6s. 9d.

Oaten Chaff.—Plentiful; demand fair; 3s. to 8s. 9d.

Maize.—Keen competition ruled for prime lines, which were scarce; 4s. 5½d. top price.

Potatoes.—Supplies lighter; improved prices; 6s. to 9s. 4d.

Sweet Potatoes sold at 2s. 9d. to 3s.

Wheat market not overstocked, most lines selling at 3s. 6d. to 6s. 1d.

Malting Barley.—One line passed in at 3s. 3d.

Pumpkins.—Good sales to 2s. 9d. A few parcels realised 3s. 4d.

Broom Millet fetched from £22 to £28 for prime hurl.

Occasional showers followed by cloudless skies marked the last week of the term. Frosts were fairly general. The rain-benefited areas included Northern, Central, coastal districts, and Darling Downs. Lucerne crops were well advanced, and a continuance of fine weather to favour harvesting was looked for. Wheat and other crops were making good growth, and the outlook generally was extremely promising. Increased marketings of all classes of produce were a feature of Roma Street. Prices were good for prime lines. For the week ended 20th August the figures were:—

Lucerne Chaff.—Fairly plentiful, a slight decrease in values; 3s. 9d. to 6s. 7d.

Oaten Chaff.—Border lines again in good demand; 5s. 6d. to 8s. 3d. Local, 5s., 5s. 6d., 6s. 3d.

Mixed Chaff.—3s. 9d. to 6s. 7d.

Wheat.—4s. 9d. to 6s. Demand slackened.

Potatoes.—Supplies increased at the end of the week, and competition, although keen at the commencement, eased off considerably. The bulk of supplies withheld at offers of 5s. 6d. to 8s. 10d. Lines sold realised from 5s. 3d. to 9s. 9d.

Sweet Potatoes.—2s. to 3s. 10d.

Pumpkins.—Demand firm; 2s. 3d. to 4s.

Maize.—Supplies heavy; prices on the up grade; 4s. 6½d. was the best sale; others from 4s. 2½d.

Broom Millet.—Prime £28, inferior down to £20.

DAIRYING.

Statistics for the dairy industry for four weeks ended 20th August include the following:—

Production.—Quantity submitted for examination for cold storage:—Butter, 40,885 boxes (each 56 lb.); cheese, 4,487 crates (each 142 lb.).

This production may be viewed as over and above local requirements and available for export.

Shipments Interstate.—Butter, 11,174 boxes; cheese, 1,024 crates.

Shipments Oversea.—Butter, 30,009 boxes; tinned butter, 109 cases; cheese, 67 crates; luncheon cheese, 4 cases.

In Cold Storage on 20th August, 1921.—Butter, 23,268 boxes (approx.); cheese, 2,669 crates (approx.).

FRUIT.

Weather conditions improved in the course of the first week of the period. The welcome dry change proved beneficial to the coming crops. Spring planting preparations were also facilitated, and a further dry spell will make for good burns in the scrub areas. Pruning and winter cultivation were the main activities in orchards and vineyards. Quantities of citrus fruits, bananas, and pineapples were coming on to the market, all of generally good quality. The demand was fair, but prices were lower than those ruling at the corresponding period of last year.

In the second week of the term fine dry days, with cold strong westerlies, had the effect of drying saturated surfaces and allowing growers of temperate fruits to proceed with spraying and pruning. Fresh planting areas were also in course of preparation in many localities. Pineapples, citrus fruits, bananas, strawberries, papaws, and cape gooseberries made up the full range of offerings. A limited number of pines were packed, and the finished product is of high quality.

Show week was remarkable for almost perfect weather. Light frosts caused some damage in exposed situations. At the Show was seen one of the finest displays of citrus varieties and other seasonable fruits ever assembled in Queensland. The Southern Queensland Fruitgrowers' Society, Limited, which represents no fewer than sixty-two individual associations, had a magnificent exhibit. The Returned Soldiers and Sailors Co-operative Fruitgrowers' Association, whose headquarters are at Woombye, also displayed a very fine trophy.

In the course of the week ended 20th August rising temperatures betokened an early spring. On the coast, vines had started growth, and vignerons had commenced spraying to prevent mildew and black spot. The preparation of country for pineapples and bananas was proceeding satisfactorily, and on the scrub areas early burns were anticipated. Very heavy crops of strawberries were coming on to the market. Berries of exceptional quality were the rule. The question of the disposal of strawberry pulp is now under consideration and, should a trial shipment be made with satisfactory results, another important step towards payable treatment of glut crops will have been taken. Bananas and pines are still coming forward in quantity and good quality. Pines are still (at the date of writing) being treated at the State and other canneries, and the quality of the output is high. The present pack is regarded as the best so far put up in the State, and that it is even better than last summer's canning.

FAT STOCK.

REPORT FOR WEEK ENDED 20TH AUGUST.

Cattle.—1,040 yarded. The general quality of the yarding was below average. Only a few lines of trade bullocks up to standard were offered. Cows made up a good proportion of the yarding, and sold well. The market generally was better than that of the previous week, and the closing sales were decidedly firmer. Best bullock beef quitted at from 24s. to 28s., good bullocks 21s. to 23s. 6d., and cows 20s.

Sheep.—About 8,400 sheep were penned, including several trainloads from the Central and Western districts. The quality was mixed, and a good number of stores were included in the offerings. All round, the market was about equal to that of the previous week, prime sheep selling to 3½d. per lb., and good trade mutton to 3d. per lb.

Orchard Notes for October.

THE COAST DISTRICTS.

October is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised, as, unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied with same. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of these spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitious plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such diseases as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy every fallen fruit. If this is done systematically by all growers early in the season, the subsequent crops of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Much of the matter contained under the heading of "The Coast Districts" applies equally to these parts of the State, as on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codling moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruits are grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful watch should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruits, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil

spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

Farm and Garden Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, tumeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred.

KITCHEN GARDEN.—Our notes for this month will not vary much from those for September. Sowings may be made of most vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Spraying for fungoid diseases should be attended to, particularly all members of the *Cucurbitaceæ* and *Solanum* families, of which melons and tomatoes are representative examples. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

FLOWER GARDEN.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant tuberose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlias, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1921.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·59	6·5	4·46	6·28
2	6·2	5·34	6·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6 8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5 36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5·37	5·21	5 51	4·53	6 10	4·46	6·33
9	5 54	5·37	5·20	5·51	4·53	6·11	4·46	6·33
10	5·53	5·37	5·19	5·52	4·52	6·11	4·47	6·34
11	5·52	5·38	5·18	5 52	4·52	6·12	4·47	6·35
12	5·51	5·38	5·17	5·53	4·51	6 13	4·47	6·36
13	5 50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·14	4·48	6·37
15	5·48	5·40	5·14	5·54	4·50	6 15	4·48	6·37
16	5·46	5 40	5·13	5·55	4·49	6·16	4·48	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·41	5·11	5·56	4·49	6·17	4·49	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6 19	4·50	6·40
21	5·41	5·42	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·42
23	5·38	5·43	5 6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·47	6·23	4·52	6·43
25	5·36	5·44	5·4	6·0	4·47	6·24	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·25	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6 25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·26	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·27	4·55	6·44
30	5·30	5·47	5·0	6·4	4·46	6·27	4·56	6·45
31	...	...	4·59	6·5	...	...	4·57	6·45

PHASES OF THE MOON, ECLIPSES, &c.

(The times stated are for Queensland New South Wales, and Victoria, where the clock time is identical).

			H.	M.	
2	Sept.	New Moon	1	33	p.m.
9	,,	First Quarter	1	30	p.m.
17	,,	Full Moon	5	20	p.m.
25	,,	Last Quarter	7	18	a.m.

Apogee on 14th at 6·0 a.m.
Perigee on 29th at 11·48 p.m.

1	Oct.	New Moon	10	26	p.m.
9	,,	First Quarter	6	12	a.m.
17	,,	Full Moon	9	0	a.m.
24	,,	Last Quarter	2	32	p.m.
31	,,	New Moon	9	39	a.m.

Apogee on 11th at 8·54 p.m.
Perigee on 27th at 4·30 p.m.

8	Nov.	First Quarter	1	54	a.m.
15	,,	Full Moon	11	39	p.m.
22	,,	Last Quarter	9	41	p.m.
29	,,	New Moon	11	26	p.m.

Apogee on 8th at 6·12 a.m.
Perigee on 21st at 7·54 p.m.

7	Dec.	First Quarter	11	20	p.m.
15	,,	Full Moon	12	50	p.m.
22	,,	Last Quarter	5	54	a.m.
29	,,	New Moon	3	39	p.m.

Apogee on 6th at 1·12 p.m.
Perigee on 18th at 7·36 a.m.

A Total Eclipse of the Sun will occur on 1st October, visible in the South Polar Region and up to a few miles south of Cape Horn.

As a partial eclipse it will be visible in the lower part of South America, but not in Africa or Australia.

The Moon will be eclipsed by the Earth almost totally on 17th October, about 9 o'clock in the morning, when it will be below the horizon in Australia.

As Mercury will be at its greatest distance east of the Sun on 8th October, it should be visible in the west soon after sunset for a fortnight or more. On the 3rd it will be to the left of the Moon, and Venus and Mars will be remarkably in juxtaposition before sunrise.

Saturn and Jupiter will pass almost directly behind the Sun on 22nd and 23rd September, and will be seen only before sunrise from about the middle of October to the end of this year.

On and about 14th November Mars and Saturn will appear to be in close proximity and Mars and Jupiter on and about 27th November.

Venus also will be a morning star till after the end of the year.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise about 4 minutes later than at Brisbane if it were not for its higher elevation, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 38 minutes respectively, later than at Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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